This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

AN EPITOME

OF THE LITERATURE OF MODERN

URINARY SURGERY.

BY THE SAME AUTHOR.

DIE VENEN DER VORDEREN RUMPFWAND DES MENSCHEN. With Prof W. BRAUNE. (Veit & Co., Leipzig.) 1884.

THE ELECTRIC ILLUMINATION OF THE BLADDER AND URETHRA. Second Edition. (Churchill.) 1889.

THE CARDINAL SYMPTOMS OF URINARY DISEASE. (Churchill.) 1893.

ATLAS OF ELECTRIC CYSTOSCOPY. With Dr. E. BURCKHARDT, of Basel. (Churchill.) 1893.

CHIRURGIE DER NIEREN—KLINISCHES HANDBUCH DER HARNORGANE. (Vogel, Leipzig). 1894.

GOLDEN RULES OF SURGICAL PRACTICE. Third Edition. (Wright & Co., Bristol.) 1892.

EPITOMES

OF MODERN SURGICAL PROGRESS:

FOR STUDENTS AND PRACTITIONERS.

URINARY SURGERY.

BY

E. HURRY FENWICK, F.R.C.S., ENG.

Surgeon to the London Hospital; Surgeon and Pathologist to St. Peter's Hospital for Stone and other Urinary Diseases; Consulting Surgeon to the West Herts Infirmary;
Late Member of the Conjoint Examining Board in England of the Royal College of Physicians and Surgeons.

ILLUSTRATED.

BRISTOL: JOHN WRIGHT & CO.
LONDON: SIMPKIN, MARSHALL, HAMILTON, KENT & CO. LTD.
HIRSCHFELD BROS., 82, HIGH HOLBORN.

1894

17.G 12.

BOSTON MEDICAL
FEB 1 5 1921
LIBRARY

PREFACE.

I HAVE been frequently asked by those who were desirous of keeping abreast with the progress of modern Surgery, whether an epitome of the recent literature of the surgery of the Urinary Organs had been published.

As far as I am aware, no *résumé* of the recent literature of this subject exists. Moreover, the changes in the methods of diagnosis and treatment have succeeded each other so rapidly that even the latest text books on surgery do not comprise them, or merely accord them a cursory notice. In arranging the following compilation of the more important contributions to this special subject, I have drawn freely upon the synopses which I have sent each year to the *Medical Annual*, and to Zuelzer's *Internationales Centralblatt für die physiologie und pathologie der Harn und Sexual Organe.* I am also indebted to Sajous's *Annual*, to Cassell's *Year Book*, and to special monographs for additional details and references.

I trust the collation will prove of service to those who are too busy to consult these sources, and who may desire to obtain a rapid survey of the many changes which have recently taken place in the methods of diagnosis and treatment of the affections of the Urinary Organs.

E. HURRY FENWICK.

14, SAVILE ROW,
BURLINGTON GARDENS,
LONDON *August*, 1894.

CONTENTS.

Surgery of the Kidney	1—48
Surgery of the Ureters	49—56
Surgery of the Bladder	57—118
Electric Cystoscopy	119—131
Diseases of the Prostate	132—162
Diseases of the Seminal Vesicles	163—164
Diseases of the Urethra	165—207
Bibliography	208—216
Index	217—219

BOSTON MEDICAL
FEB 15 1921
LIBRARY

URINARY SURGERY.

SURGERY OF THE KIDNEY.

IT must be borne in mind that Renal Surgery is a growth of the last ten or twelve years. Every year an additional impetus has been given to the sound progress of this important branch of operative surgery by the publication of records of cases in which successful and unsuccessful interference has been undertaken. Opinions, concerning the advisability of this or that operation, were at first very conflicting, but gradually these have become modified or even dismissed by general consensus. After the lapse of a decade it may be safely asserted that there is but slight and probably unimportant discordance in the views which are held about the indications for operative treatment of surgical renal disease.

EXPERIMENTAL INVESTIGATION RELATIVE TO OPERATIVE TECHNIQUE.

Nephrotomy.—An important investigation has been carried out by Dr. Barth[1] (Marburg) concerning the healing of renal wounds and the restoration of renal tissue. The animals chosen were rabbits, guinea pigs, and dogs. Large wedge-shaped pieces were excised from the kidneys, generally in the longitudinal direction, and the wound closed in the usual manner. Although the wound rapidly healed, yet the renal tissue in the neighbourhood underwent *grave nutritive changes* in consequence of the disturbance of the circulation.

Dr. Barth stated that the microscopy of kidneys which have been treated in this manner shows that the urinary canaliculi are most severely implicated, and may be discovered in all grades of destruction, from complete necrosis to the merest alteration of their epithelial lining. Granulation tissue, however, quickly originated from the Malpighian capsules and intertubular spaces, and pushed its way into the coagulum of blood filling the defect, and replaced it completely by the eighth or eleventh day. Contraction and cicatrisation then ensued. It was noticeable, however, that renal tissue was under no circumstance reproduced, as asserted by Tuffier, Kummel and Paoli.

Compensatory hypertrophy, however, took place in the operated as well as in the intact organ, being especially noticeable in the cortical substance by an increase in all its elements. The glomeruli enlarged, their capsules dilated, and the canaliculi grew in circumference, and also probably in length.

A series of interesting experiments have been performed on dogs by Dr. Schachner,[2] of Louisville, with a view of elucidating some problems in the technique of the treatment of injuries and diseases of the kidney.

The methods adopted in this research are too numerous to reproduce here, but the following conclusions arrived at by Dr. Schachner are worth recording: (1,) The disproportion which frequently exists between the cause and the effect of injuries of the kidney can alone be explained upon its peculiar anatomical structure, its physiological function, and the frequency with which this organ is found in a more or less abnormal condition at the time of the accident; (2,) The external damage offers no safe criterion as to the extent of the internal injury; (3,) In all operative attacks upon the kidney, the capsule and perirenal structure should be preserved as carefully as possible, since these not only add to the strength of the purchase of sutures, but afford additional protection against hæmorrhage and sepsis; (4,) A gun-shot injury, amounting to a simple perforation, is best controlled by the application of a "purse-string suture" to both

orifices (*Fig.* 1); (5,) This may be reinforced by a covering of perirenal structure drawn together in a similar

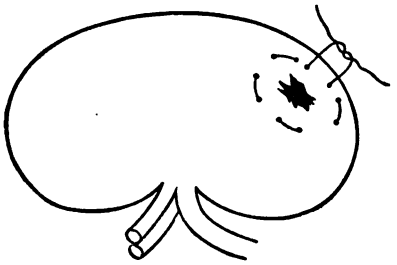


FIG. 1.
"Purse-string" suture applied to a gun-shot perforation.

manner; (6,) The hæmorrhage from *superficial lacerating* wounds of the kidney can confidently be arrested in the majority of instances by means of a single or double-purse string suture, applied one cm. or more from its edge (*Fig.* 2); (7,) The great omentum can frequently be

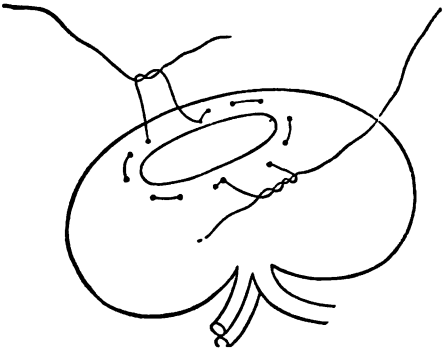


FIG. 2.
Showing the application of a double "purse-string" suture for the arrest of hæmorrhage in large superficial gun-shot wounds.

employed as a valuable adjuvant in controlling the hæmorrhage, and in adding to the safety in many operations upon this organ; (8,) Incised wounds, whose aseptic nature is questionable, are best treated by tampon and

drainage through the loin; (9,) Wounds of the pelvis should be closed with a double row of sutures, as an additional measure against the formation of a fistula; (10,) Unless the wound of the ureter is singularly slight as compared with the size of the duct, nephrectomy is, as a rule, indicated as the most practical step; (11,) The incision in partial resection of the kidney for the relief of an injury, should be made distant from the contused region to insure the apposition of two healthy renal surfaces.

Nephrotomy and Nephrorrhaphy.—Schachner[2] asserts (1,) Where the operation is of the character of a nephrotomy, dependent upon some cystic or suppurative process, the lumbar is the preferable incision; (2,) Whenever the lumbar incision becomes insufficient, the space can be enlarged by another incision in a horizontal manner, after the method of König, or as recommended by Newman; (3,) Unless specially contra-indicated by reason of sepsis, or other valid causes, the abdominal incision should be preferred; (4,) Procrastination means untold suffering to the individual, and the steady increase of the dangers militate against the ultimate success of the operation; (5,) The renal artery can be safely and securely compressed, rendering not only the operative field bloodless, but adding to the thoroughness of the operation and the chances of its success; (6,) The closure of the wound, unless contra-indicated by drainage, should be preceded by a careful irrigation of

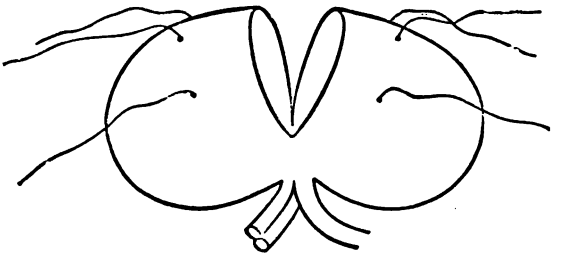


FIG 3.
Introduction of stitches for the closure of the deeper portion of a resection.

the pelvis, and a thorough removal of all blood clots; (7,) Whenever practicable, an incision through the kidney substance should be given the preference over one performed through its pelvis; (8,) The bottom of the renal incision should be approximated by means of deep sutures, while the superficial edges are united by a separate row of superficial stitches (*Fig.* 3); (9,) If the kidney has been much disturbed it should be stitched *in situ* (Jacobson); (10,) In anchoring a floating kidney, it should be replaced as nearly as possible in its natural location.

Occlusion of the Ureters.—Some interesting experiments upon ligature of the ureters in dogs have been made by Robinson[3], of Chicago, and although the series is too small to allow of dogmatic deduction, it affords a basis for the belief that complete aseptic occlusion of the ureter produces atrophy of one kidney, and partial occlusion induces hydronephrosis. Dr. Robinson asserts that the kidney will bear complete occlusion for some weeks, and then resume its function after the obstruction and pressure have been removed. He mentions the case of a lady whose ureter was ligatured and remained thus constricted for six weeks, yet the kidney resumed its work after removal of the ligature. He states that he believes that the ureter is occluded in the ligature in three in every hundred cases of vaginal or abdominal hysterectomy.

Lewin and Goldschmidt[4] have published an important series of experimental researches upon the behaviour of the ureter under intravesical pressure. They prove that, in the guinea pig and rabbit, the ureters and pelves of the kidneys are quickly filled with any form of injection distending the bladder. Milk, air, or coloured fluids injected into the bladder were seen through a laparotomy wound to rapidly overcome the sphincter which exists at the lower end of each ureter, and to gradually fill and over-distend the upper urinary passages. It is stated, moreover, that when the distention was not carried to excess, the ureters spasmodically contracted, and attempted to rid themselves of their foreign contents. These

acts will probably explain much that is at present unaccountable in renal surgery, viz., the causation of hydronephrosis without apparent obstruction of the ureter, the rapid onset of urethral fever, etc. It points also to the danger of introducing air into the bladder in irrigation; and to the questionable value of using air in expanding that viscus for suprapubic cystotomy.

Uretero-Enterostomy.— Morestin[5] shows, experimentally, how unsatisfactory is the plan of fixing ureters into the rectum or intestine. Either the cut ends of the transplanted ureters slip, and fatal peritonitis ensues; or if the stitches hold, the orifice of the ureter either remains permeable, and permits microbic infection of the kidney from the gut; or contracts and hydronephrosis ensues.

IMPORTANT POINTS IN THE TECHNIQUE OF OPERATIONS UPON THE KIDNEY.

Much sound knowledge of the *technique* and value of the various procedures was placed before the profession at the Leeds Meeting of the British Medical Association in 1889[6]. Much has since been added. It will therefore be profitable to glance briefly at the present position of the subject, and in doing so it will be more convenient to divide the *résumé* under the headings of (1,) Puncture; (2,) Fixation; (3,) Incision; and (4,) Excision of the Kidney. Moreover it will be wiser, merely to reflect rather than to attempt to reconcile the slightly divergent opinions concerning the indications for the employment of these several operations.

I.—Puncture or Aspiration of the Kidney.

The use of the aspirator needle is restricted: (1,) To decide in doubtful cases between solid and fluid tumours of the kidney; (2,) As a tentative attempt at cure in some cases of simple cyst or hydronephrosis, though the chance of cure is, Mr. Thornton[7] thinks, very slight; (3,) To localise the position of renal or circumrenal abscess, when the physical signs are not clear enough

for free incision. In such cases puncture is to be immediately followed by free incision when the pus is found; (4,) To remove urine or serum, or pus from a very large tumour to reduce its bulk during the performance of nephrectomy.

The site for the entrance of the Trocar or Aspirator.— Percussion is the safe guide, but the trocar should generally be introduced far back in the loin to avoid the risk of puncturing the colon or peritoneum. Mr. Henry Morris[8] advises that if there be any spot over the swelling which is thin, soft, prominent or fluctuating, the trocar should be inserted there. Certain precautions have to be observed. The skin round the proposed site of puncture, the trocar and cannula, must be carefully purified by a watery solution of corrosive sublimate. In withdrawing the instrument, it is of the highest importance to bring with it all the fluid it contains and not to permit any leakage into the tissues through which the cannula passes after leaving the kidney. *A grooved needle* should never be used.* Mr. Thornton[7] quotes the case of a young lady suffering from tubercular kidney who never suffered any pain until the kidney was punctured and the disease thus diffused through the perinephric tissues, and for this reason the same surgeon does not believe puncture is justifiable in pyonephrosis. Its use in hydatid disease is inadvisable, as it is impossible to thoroughly evacuate the daughter cysts and membranes, and experience has shown that suppuration is frequently induced by puncture.

At first there was some considerable difference of opinion as to the advisability of repeated aspirations for hydronephrosis when large enough to form an abdominal

* *Needling* is a form of exploratory puncture which found favour with some surgeons to verify the presence of stone in the kidney. It consists in introducing a needle into the kidney from the loin. It has, however, nothing to recommend it. It is not devoid of danger, for the kidney may be transfixed and the bowel or peritoneum pierced, or the large vessels wounded, and the needle may have to be introduced many times before the stone is struck. Needling the *exposed* kidney will be referred to under the heading of Nephrolithotomy.

tumour, but it is now allowed that nephrectomy without preliminary operative treatment is the true surgery.

II.—Fixation of the Kidney (Nephrorrhaphy, Nephropexy).

The Technique of Nephrorrhaphy.—After free exposure of the kidney the sutures are passed directly through the parenchyma. Kangaroo tendon is used by Mr. Morris[8], who describes the operation thus: "Three kangaroo tendons are passed through the posterior surface of the kidney, one nearer the upper, the other nearer the lower end, and the third midway between the other two, but nearer the hilum. Each suture is buried for a length of three-quarters of an inch within the renal substance, and penetrates about half-an-inch into the thickness of the organ. The upper suture passes through the upper edge of the shortened adipose capsule, the transversalis fascia, and the muscles, and is tied to them; the lower suture is similarly passed through and tied to the lower edges of the cut structures, and the intermediate suture is passed through both edges of the divided capsule, fascia, and muscles, and laces all up together."

Dr. Newman[9] prefers chromicised gut, for he has found that sutures passed through the kidney become destroyed more rapidly than elsewhere. The sutures do not tear out unless tied too tightly. They do not cause any permanent damage to the renal structure (Bassini[10], Vannefville[11], Tuffier[12]). Some surgeons aim at stirring up irritation and subsequent inflammatory adhesions by placing a large rubber drain against the convex margin of the kidney.

Or a certain portion of the capsule proper is stripped off the kidney, and the sutures passing through its parenchyma bring the raw surface thus made directly in contact with the cut tissues in the loin. The sutures enter and emerge through the capsule just outside of the raw margin, and are then passed through the tissues on each side of the incision which is closely united.

Mr. Lane[13] exposes fully the posterior surface of the

kidney, and splits the capsule into ten triangles by means of incisions radiating from the centre, the bases of the triangles being at the margin of the kidney. Every particle of fat and transversalis fascia, etc., is removed. Each triangle of capsule is reflected and twisted up, and to each is attached a twisted silk ligature. These ligatures are passed through the cut surface of the abdominal muscles in such a manner that the posterior surface of the kidney, freed of its capsule, is retained immovable in immediate contact with the recently-cut surface of muscle by means of its capsule, which is anchored firmly by its ten attachments. Rapid recovery resulted in the case he reports. Twelve months after, whilst lifting a heavy box, the patient had a return of pain, so that she dreaded a further development. The kidney was again exposed in the loin, when it was found to be embedded in a dense fibrous material, which connected it intimately to the cicatrix in the abdominal wall.

Rotch[14] records a case of double nephrorrhaphy at an interval of one month between the operations. Each kidney was fastened to the quadratus muscle by three stitches through the capsule. There was some suppuration on the right side from a ligature, which was removed. Five months after the first operation both kidneys were found fixed in the lumbar region.

Results. — Although one hundred and seventeen nephrorrhaphies have been collected by Drs. Lindner[15], Keen[16], and McCoosh[17], it is too early as yet to draw any definite conclusions as to the relative proportion of successes and failures. Morris claims seven successes out of ten cases. Frank quotes eleven permanent cures, four improvements, and six failures, out of twenty-one nephrorrhaphies. Two deaths are recorded in one hundred and seventeen cases, viz., Cecherelli's[18] case in which the kidney was sutured to the twelfth rib and the pleura opened, with the result that fatal pleurisy ensued; and Langenbuch's[19] case in which death took place on the third day from septicæmia, the suture having passed through an old embolic infarct in the kidney. (*Vide page 27 for latest results.*)

III.—Incision of the Kidney (Nephrotomy, Nephrolithotomy).

Nephrotomy.—Mr. Thornton[7] would restrict the use of nephrotomy (1,) To cases of calculous suppression, in which incision seems preferable to mere puncture, with the chance of being also able to remove the stone; (2,) For the cure, by subsequent drainage, of simple cysts, abscesses, and hydatids. The question of possible cure in some cases of hydronephrosis to be further tested; (3,) For the cure, by subsequent drainage, of traumatic pyonephrosis or pyelitis, and in the early stages of tubercular suppuration; (4,) For the possible cure of more advanced calculous or tubercular suppurations, when the patient will not submit to nephrectomy; (5,) For the performance of nephrolithotomy in some cases, if extended experience shows that this procedure possesses any advantages over the "*combined method*," or when those who have no experience in abdominal surgery are compelled to operate. There is still a difference of opinion as to the employment of nephrotomy and drainage for advanced cases of calculous and tubercular pyonephrosis. Most surgeons object to it, especially when used as a preliminary to nephrectomy, because, without offering any compensatory advantage, it leads to prolonged and exhausting suppuration, to infection of the loin tissues with the pus from the kidney, and to very dense adhesions and to fistulæ, which make a future nephrectomy much more difficult and dangerous. Mr. Thornton[7] says, "The suppuration which frequently follows a nephrotomy in these cases cannot but weaken and injure the patient, and tend to produce amyloid disease in the opposite kidney. The diminution of the size of the vessels, said to occur, is a matter of no consequence in these days of aseptic ligature and forci-pressure. The diminution in the size of the kidney is of equally little consequence, for this can be rapidly produced during nephrectomy by the use of the aspirator. The advantage of the less friability of the kidney and of the tolerance of surrounding parts is dearly bought by the presence of a permanent

fistula, and by the replacing of soft and easily divided adhesions by dense cicatricial tissue, not to mention the extensive formation of adhesions in the track of the lumbar operation which would have had no existence but for that operation. This fistulous track is certain to be putrid after prolonged external suppuration; for if putridity is not present, the sinus is pretty certain to heal; but this cannot happen in the presence of multiple or branched calculi, or of caseous masses in the deep recesses of the kidney. It is quite possible to enucleate a pyonephrosis entire, and without fouling of the wound, before there is a sinus, but quite impossible after there is one."

Mr. Reginald Harrison[20] in an interesting and suggestive article on suppurating kidneys, the result of prostatic and urethral obstructive disease, advocates draining both the kidneys by a perineal opening.

Nephrolithotomy.—Early diagnosis and the extraction of the stone from the kidney before suppurative changes have been induced by it, is one of the great elements in the successful treatment of renal calculus (Henry Morris, Newman).

It is, however, a matter of common experience that explorative incisions not infrequently fail in the detection of a calculus, which was presumed from the typical character of the symptoms to have been present, and that, as Mr. Jacobson[21] says, "Nephrolithotomy is one of those advances in modern surgery in which the operation has outstripped the diagnosis." If, then, our diagnosis needs propping up by digital exploration of the kidney, what is the actual risk of that procedure?

Mr. Lawson Tait[22] records forty-eight cases of nephrolithotomy with one death (2 per cent. mortality), and the general consensus of opinion is in accord with Prof. Keyes[23] of New York, who asserts that the posterior exploratory incision upon a kidney suspected to contain stone, is devoid of any serious danger when performed with proper care; it should be resorted to more often than is at this date sanctioned by general surgical opinion.

The Incisions for removing Renal Calculi.—(1,) The lumbar incision (nephrotomy), which may be enlarged in various ways, is the path usually adopted; (2,) The "combined" method which is advocated by Mr. Thornton consists in opening the abdomen through the linea semilunaris over the suspected kidney; one hand then searches both kidneys and ureters, and having found a stone, it fixes the kidney while the other cuts down upon the stone directly from the loin, merely making an opening through the loin tissues large enough to introduce the finger and the necessary forceps for the extirpation of the stone.

The Advantages claimed for the "Combined" Method.—(1,) Certainty of examination of both kidneys and ureters, and the affected side being discovered; (2,) Greater ease and certainty of finding the stone; (3,) Less risk of injury to the colon or peritoneum by the knife, because they are guarded by the hand in the peritoneum; (4) A small clean cut on to the stone is all the damage inflicted on the loin tissues; there is therefore less risk of (*a*,) extravasation; (*b*,) suppuration; (*c*,) loin hernia. Probably few surgeons except those who operate through the peritoneum by preference will prefer the combined method. Very many surgeons hold that the hand is a most inefficient guide to the working condition of the kidney. Nor is it allowed that the pain of renal stone, except in rare instances, is felt in the opposite and unaffected kidney, as Mr. Thornton believes. Moreover, by the combined method the fingers can only search the front of the kidney, and many of the calculi lie in the cortex of the posterior surface. Moreover, in aseptic and careful hands extravasation and suppuration from the posterior incision are less likely to occur with a larger wound than a small puncture, because of wider field and freer drainage, and lastly loin hernia ought not to occur under any conditions if the deep muscles have been carefully sutured.

The Position in which Stones are found in the Kidney.—Stones are found embedded in the kidney in various ways: If they are fixed in the parenchyma towards the

surface, the finger tip detects them, though tubercle of the kidney and suppurating foci often mislead by giving rise to the same tactile impressions (H. Morris[24]). The entire pelvis may be filled by a large branched calculus, which may be embraced so tightly by the kidney as to cause it to be mistaken for a tough kidney. Stones in the pelvis may be free, or fixed in a recess of a calyx. Both sorts are difficult to detect if small.

The general rule laid down is as follows: If palpation or needling do not detect the stone, the pelvis must be examined digitally or with a child's bladder sound. In breaking into the pelvis some prefer entering through the cortex, and assert there is less risk of urinary fistula (there is certainly more profuse hæmorrhage); others cut directly into the pelvis. Opinions still differ on this point. Morris is still inclined, as he has been from the first, to the belief that the route through the renal substance is the best. M. Tuffier also inclines to this view, believing that the wound in the pelvis is a more dangerous operation, and that the wound heals less readily. He puts the mortality of nephrolithotomy at 6 per cent., and the frequency of fistula at 3·33 per cent., whereas the mortality of pyelotomy he finds is 16·66 per cent., and the frequency of fistula is 20 per cent. Mr. Jordan Lloyd[25] recommends that the lowest calyx be opened by a narrow- bladed tenotome, and a child's bladder sound inserted into the pelvis: "It should be carried at once to the top of the kidney cavity, a distance of nearly four inches, and the exploration should be carried out systematically from above downwards, the point being rotated in all directions, so as to investigate both tubes and calyces as the instrument is withdrawn." There are some small stones which it is almost impossible to feel with the finger searching the pelvis. Mr. Jordan Lloyd has shown by a series of paraffin casts of fifty renal pelves, that our anatomical conceptions of the calyces are erroneous, that they are not dilated pouches which can be easily examined by the finger, but narrow, often long and branched, canals.

The method of exploration adopted by Mr. Morris[26] in

each case is very thorough. "The kidney is turned out on to the surface of the loin, and examined with the eye, as well as with the finger and thumb, the needle and the trocar. The convex border is incised, and the finger introduced into the pelvis. With the finger within and the thumb on the surface, every portion of the substance is squeezed, in order to detect any undue hardness or softness, any resistance or flaccidity of the organ. The renal pelvis and upper part of the ureter in this way are also thoroughly examined. When no stone has been found, the cut surfaces of the kidney are sutured with catgut, passed through the substance from front to back (*compare Fig.* 3), before returning the kidney into the abdomen. In this way hæmorrhage is checked, and the wound in the parietes of the loin can be got to heal by first intention without the necessity of draining."

Needling the Exposed Kidney.—Acupuncture (contemptuously termed by one authority "broddling the kidney with a skewer") is used by surgeons to determine the nature of a hard nodule in the cortex, or in searching the interior of a "soft patch" in the kidney. To systematically search for a stone by this means is uncertain and unsurgical.

Additional Points in the Technique of the Operation.—(1,) Count the ribs. The last rib may be rudimentary, and the pleura projects a good deal below the lower edge of the eleventh rib; (2,) Some of the branches of a large calculus easily escape detection; (3,) A small stone in a pyonephrotic sac is most difficult to seize if it is not caught in the first rush of the collected fluid; (4,) Mr. Jacobson recommends that if the kidney is much disturbed it should be stitched *in situ;* (5,) There is a difference in the appearance of a tubercular kidney, and of a kidney the seat of a calculus. The former has a yellow-whitish mottling, or a starred and fissured pallid surface; the latter is even, and of a uniform dark red almost to bluish black colour (Henry Morris); (6,) Hæmorrhage from an incision into the kidney is certainly arrested by firm, careful, and thorough plugging with strips of sal alembroth gauze. This plugging was

in one instance supposed to have caused vomiting and colic (Kendal Franks[27]).

IV.—Excision of the Kidney (Nephrectomy).

*The Indications for Nephrectomy**—(1,) Tubercular kidney in quite the earlier stages; (2,) Tubercular pyelitis or pyonephrosis explored previously and drained by nephrotomy, but in which a discharging sinus persists; (3,) Large hydro-nephrosis, unrelieved by drainage; (4,) Calculus pyelitis or pyonephrosis; (5,) Sarcomata in the adult and in the earliest stage; (6,) Wounded or ruptured kidney injured beyond repair.

Methods.—(*a*,) Lumbar; (*b*,) Abdominal.—(*a*,) Lumbar nephrectomy is the more popular, perhaps because that in it the peritoneum is unopened, and the wound permits of good drainage. Many believe that lumbar nephrectomy is the best method of dealing with pyo- and hydro-nephrosis, whilst the abdominal route should be reserved for benign and malignant tumours, but there are serious objections to these views. Mr. Thornton and others, backed by the great success obtained through the peritoneal path, have strenuously combated them. These objections are: (1,) The small space available for incision in most cases; (2,) The danger of wounding a pleura with a low insertion; (3,) The danger of wounding the colon or the peritoneum, and of fouling the latter without being aware of the accident; (4,) The possibility of not being able to find the kidney at all, an accident which has happened in a large number of cases, and to experienced surgeons; (5,) The possibility of removing a single kidney, without knowing that the patient has only the one; (6,) The impossibility of noting the condition of the other kidney and ureter; (7,) The fact that it is only suitable for a limited number of cases, it being impossible to remove much-enlarged

* Tuffier observed that for each kilogramme of animal 1½ grammes of secreting substance of kidney was necessary. On this basis the ordinary man needs 80 to 100 grammes (2½ to 3½ oz.), one-third to one-fourth of what he actually possesses. Quoted from Keyes (Sajous' *Annual*, E—16, Vol iii. 1891.)

kidneys through any incision that can be confined to the loin. There are, however, some conditions in which the lumbar operation may properly be performed, notably cases in which a lumbar incision and drainage having failed, the extirpation has to be undertaken with a fœtid sinus, already extending from the loin into the interior of the kidney; also in some cases of wound of the kidney.

Mr. Lawson Tait gives his opinion as follows: "The real fact is, the kidney is best reached by the most likely looking road, and in this respect different patients exhibit great variety of conditions. Whether the peritoneum be opened or not makes not a scrap of difference to the mortality, and makes very little difference as to the technique of the operation." Mr. Tait's mortality in nephrectomy is 18 per cent.

With resection of Ribs.—Nephrectomy, with resection of one or more ribs, if necessary, is advocated by Lange, of New York, who holds that dogmatic rules about which incision should be used in nephrectomy, should not be laid down. The size, and especially the position of the organ, also the nature of the disease, decides one or other of the two routes (abdominal or lumbar) to be preferable. In one woman, in whom the lower portion of the thorax was narrow, he resected the last two ribs, and thus widened the lower aperture of the thorax considerably.

Points in the Technique.—(1,) If the tumour is of a suspicious nature and nephrectomy be determined on, the capsule should be removed, though the disease will recur in 50 per cent. of the cases of solid tumour whether this be done or not. If the kidney be merely the seat of inflammatory destruction the capsule may be left (Tait); (2,) Whenever it is possible, after the kidney has been shelled out of its capsule, the edges of the capsule should be stitched to the skin when the pedicle has been secured. The advantages of this are (*a*,) that the wound heals readily; (*b*,) the pedicle can be readily reached if recurrent or secondary hæmorrhage ensues, and pressure can be easily applied; (*c*,) the ureter will not infect the general cavity of the wound (Bruce-Clarke).

Ligature of Pedicle in Abdominal Nephrectomy.—(*a*,) *The Vessels.*—"When it is found that the tissues lying above the kidney are normal, the fingers can be gradually insinuated under the peritoneal covering till the aorta is reached; from it the renal artery can be traced, and then the vessels can be ligatured before the kidney is enucleated, but when, on the other hand, there is much inflammatory thickening of the tissues and adhesion, the kidney must be enucleated before the vessels can be reached and cleared. In old standing cases of pyelitis or pyonephrosis, the adhesions about the vessels and hilum are often extremely dense and thick, so that the renal vessels can only be discovered when they are cut across and bleed, and can only be secured by running a needle armed with silk under their mouth in this dense tissue"; (*b*,) *The Ureter.*—"The last part to separate is the ureter, and before separation its renal end should be secured by pressure forceps, then a ligature tied a little way from the forceps, and a sponge placed under it before it is divided. Whenever it is possible I enucleate it for some distance from the kidney before dividing it, so that its cut end, with the sponge under it, may be at once drawn outside the abdomen; and I afterwards fix it in the lower angle or most convenient part of the abdominal incision with a cleansed safety pin. I regard this fixing out of the stump of the ureter as the most important detail in the operation, and in every case in which I have been obliged to cut it off deep in the wound I have had distinct evidence of suppuration and trouble around it" (K. Thornton). The danger of thus fixing the ureter in the wound lies in the subsequent chance of strangulation of the intestines by band.

Statistics of Nephrectomy.

Mr. Morris,[28] in a lecture on nephrectomy, places twenty-three cases of this operation on record, and points out from his own experience that the consequent mortality varies much more with the nature of the disease than with the method of operating. He states that "if

nephrectomy was limited to hydronephrosis, to disorganization from calculus, to the rare cases of renal and ureteral fistulæ, and to movable kidney for which it would be justifiable to operate, the mortality would not be much higher than that of ovariotomy. The malignant renal tumours, the supra-renal tumours, the tuberculous affections of the kidney in which other organs, and too often the other kidney itself, are affected by the same disease, form the reasons why the mortality of nephrectomy should be so high." He points out, therefore, that it is not fair to patients suffering from the less hopeless conditions, and with a state of general health not unfavourable to recovery from nephrectomy, to hesitate in recommending them the benefit of the operation, because of a death-rate largely formed by hopeless, or all but hopeless, cases. Mr. Morris's statistics bear out this contention—six cases of hydronephrosis without a death; seven cases of calculous affections with two deaths; five cases of nephrectomy for solid tumours, with two deaths; five cases of a tuberculous disease with three deaths. If taken over the whole series the mortality is 7 in 23, or 30·4 per cent.

Schede,[29] of Hamburgh, records a series of ten cases of nephrectomy without a death. Formerly he had operated seven times with six recoveries, thus making a total of seventeen cases with one death. This, as the cases are not picked, shows how the mortality has decreased in the hands of a highly skilled general surgeon, for the statistics of Gross showed a mortality of 44·6 per cent., of Brodeur, 44·4 per cent., and of Czerny 44·4 per cent., of Morris 30·4 per cent., and of Tait 18 per cent. Of the ten cases last recorded by Schede three were for carcinoma, two for tuberculosis, four for pyonephrosis; but the most interesting case was one of uncontrollable renal hæmorrhage.

A man, aged fifty, passed bloody urine for the first time after a cold drink. He had frequently before noticed a sensation of cold in the left lumbar region. If he remained quietly in bed the bleeding ceased, but it returned directly he got up. Stypics did not relieve the

condition, and the blood was proved by catheterism of the ureters to issue from the left ureter. Left nephrectomy was performed, the kidney substance was found to be very friable, and microscopical examination of it revealed what was invisible to the eye, viz., an anæmic condition interspersed with small petechiæ, and decayed cylinders covered with red blood cells.

Czerny's results at Heidelberg with Nephrectomy were :—

	Recoveries.	Deaths.
5 Pyelonephrosis	2	3
4 Hydronephrosis	1	3
1 Uretero-Vaginal Fistula	1	0
12 Malignant Growths	3	9
11 Suppurating Kidney	9	2
33	16	17

Barth of Marburg[30] collates one hundred cases of nephrectomy for malignant disease. Of these, forty-two died from the operation, twenty died of metastasis or intercurrent disorders, and thirty-eight were reported cured.

Extirpation of Renal Cysts by Dissection.

Professor Tuffier[31] has suggested a modification to supersede nephrectomy for renal cysts. He argues that the best treatment in cases of large unilocular cyst of the kidney is extirpation of the sac by dissection, and immediate closure by sutures of the renal wound. This method, it is held, is as radical in character as nephrectomy, promises to be less dangerous than this operation, and is certainly less difficult in its performance. A single and unilocular renal cyst is almost invariably a benign growth. The inner surface of the sac is not lined by any active or vegetating epithelium, and in this respect the single cyst differs from the growths met with in polycystic disease of the kidney. The unilocular growth rarely affects the pedicle or the peritoneal surface of the kidney, and is usually met with at one of the extremities of the organ. In dealing with objections that might be brought against the method, Tuffier states that though

hæmorrhage from the incised renal parenchyma is usually very copious it may be readily arrested by gentle pressure. During dissection of the sac and approximation of the raw surfaces of the kidney by sutures he would have the pedicle compressed by an assistant, and thus be able to complete his operation with very little loss of blood. Extirpation of the cyst alone is not likely to be followed by a fistula.

GENERAL SURGERY OF THE KIDNEY.

Palpation of the Kidney.—Israel's[32] method of palpation is a very satisfactory one. A line parallel with the middle line of the abdomen is drawn from the middle of Poupart's ligament to the margin of the ribs. The finger-tips placed two finger-breadths below the margin of the ribs, and upon this line, are directly over the lower extremity of a kidney in place. In order to feel this kidney we must avoid poking with eager hooked fingers, or the abdominal muscles will contract in resentment. The tips of the straight extended fingers are placed upon the point indicated while the patient lies supine, with flexed legs, upon a hard bed or table. The other hand now lifts the loin gently towards the opposed fingers. At each expiration of the patient's breath the fingers upon the abdomen are pressed a little farther toward the kidney, and the impressions of touch kept well in mind. It is not long before the fingers easily recognise the object sought for. If the patient now takes a full breath, a wandering kidney will be forced far under the finger-tips, and in certain instances it can be forced entirely past them, as a grape pops out of its skin.

Guyon finds the kidney by approaching it as Israel does, and then, by sharp pressure of the fingers in the loin, causes spasmodic contraction of the quadratus lumborum muscle and a consequent bumping of the kidney against the fingers upon the anterior abdominal wall.

We can often distinguish a moving kidney from a moving distended gall bladder by noting the arcs of the

circles which the two describe about the fixed points of their respective radii.

Neuralgia of the Kidney Simulating Stone.—Dr. Felix Lequen[33] raises the question of the relief often obtained by patients from nephrotomy after having suffered from classical symptoms of renal calculus. The following case is quoted from Guyon's practice: A male, æt. twenty-six, had suffered from repeated attacks of violent pain in the region of the left kidney, extending downwards to the testicles. There was also hæmaturia, vesical tenesmus, and vomiting. Nephrotomy was performed, but no calculus could be found, and the patient was relieved.

Similar cases are reported by Sobater, Durham, Reynaud, Tiffany, and many others. In one instance a subsequent autopsy, and in another a nephrectomy demonstrated the absence of disease of any kind.

Dr. Oscar Bloch,[34] supplies an important addition to our knowledge of the surprising effects which often follow exploratory incision in certain obscure renal cases. He relates three cases. In one the adhesions between the fibrous and the fatty capsule were separated with complete relief of all the symptoms; in another, which was suffering from symptoms of renal stone, the incision into the renal tissue was followed by a like effect; and in a third, which presented symptoms of renal neuralgia, was cured by splitting the capsule crucially.

Mr. Morris has pointed out that probably in some of these cases the symptoms are due to movable kidney, and the mere fixation produced by the adhesions, straightens the ureter and prevents the damming back of the urine. But this explanation does not cover all conditions. In some the capsule is over-tense, and incision relieves it. In others a mild pyelitis exists, which is cured by the counter-irritation set up by the exploration (Cp. Hurry Fenwick, "Cardinal Symptoms," p. 246).

RUPTURE OF THE KIDNEY.

It is now an accepted rule of treatment for severe rupture of the kidney without external wound, in which

the escape of the hæmorrhage, per urethram, shows that the laceration has been extensive, that nephrotomy should be performed without delay, and that clots should be cleared out, any isolated piece torn off the kidney removed, and the wound thoroughly cleansed and drained. This prevents descending inflammatory changes, the inevitable cystitis is averted, and danger to the opposite kidney prevented. I know of no case more valuable in demonstrating the danger of neglecting severe crushes of the kidney than that reported by Reeves.[35]

CASE 24.—T. W—, æt. nineteen, fell from a cart, and was admitted into hospital on the same day (May 13th, 1884). His seventh and eighth right ribs were fractured near the costal cartilages, and there was localised surgical emphysema. He complained of pain on the right side of the abdomen and loin, but there was no external evidence of injury. The same evening his urine contained a little blood, but only just enough to make it smoky. Between the 13th and 22nd the pain in the abdomen and flank diminished, and abdominal discomfort was only complained of occasionally, while the hæmaturia remained the same as on admission. On the morning of the 23rd he became suddenly faint, and passed a pint and a quarter of nearly pure blood, and during the next four days he passed a large quantity during each twenty-four hours. His pulse was rapid and feeble, temperature high, and surface pallid. He complained of pain over his bladder, in which region there were dulness and tenderness, so a catheter was passed, and a good deal of bloody urine and some small clots withdrawn. There was considerable vesical tenesmus, and the lad seemed to ease himself by pressing on the end of the penis. During the second week the urine became ammoniacal. On the 27th hæmaturia entirely ceased for twenty-four hours, when he had another attack, which lasted until a terebinth mixture every two hours was prescribed, followed next day by subcutaneous injections of sclerotic acid. These stayed the external hæmorrhage for a few days, or perhaps it would be more correct to say appeared to stay it, for internal bleeding

must have been going on, as was shown by the large quantity of blood and clots found post mortem. The abdominal and lumbar tenderness increased; the muscles on the right were very rigid. There was great pain over the region of the right kidney and over the hypogastrium, and in the former situation there was a distinct doughy fulness. The tongue became dryish and brown at centre, the pulse and temperature indicated inflammatory mischief, and his countenance became anxious. During the remaining week of his life there was little or no hæmaturia, but the lumbar tenderness and pain increased, and the symptoms of peritonitis supervening, he died a month after admission.

Necropsy.—Body exsanguine. Rigor mortis moderately well marked. No external sign of injury. The seventh and eighth ribs were the only ones fractured. No injury to the diaphragm could be made out, and there was no pleurisy. The abdomen contained a moderate quantity of blood-stained serum, and at its right posterior aspect was a fluctuating swelling of considerable size, on cutting into which a very large quantity of blood and broken-down clots were turned out. There was much difficulty at first in recognising the kidney, but on cleansing the parts its remains were discovered, and it was found that only a small portion of its upper and lower ends was left, and these were much blanched. The remains of the kidney substance formed a broken-down pulp. It could not be clearly made out if the renal vessels were torn, but the pelvis and upper part of the ureter, though severed in part, still remained attached to the organ. There was a rounded, venous-looking tumour in the neighbourhood of what was taken to be the hilum, which proved to be a false aneurism of a branch of the renal artery. The bladder was distended to about the size of two moderate fists. On removal its coats were found much thickened, and there was severe cystitis. It contained three large partly decolorised clots, the largest of which resembled a good-sized kidney potato. There were also some broken-down blood and offensive urine. The left kidney was found to be in an early stage of interstitial nephritis.

In commenting on this case Mr. Reeves says, "Directly it is found that bleeding is not controllable after trial of every known means, and before the patient is too weakened by hæmorrhage, and also before septic phenomena have been allowed time to develop to an uncontrollable extent, a lumbar incision should be made over the kidney, and all clots, effused blood, and *débris* removed, and the cavity thoroughly cleansed. Then if it be possible to make out the remains of the kidney, and to find the renal vessels and ureter, these should be tied and the renal remnants removed." He also suggests that should septic cystitis ensue, and the bladder be unable to expel the clots, a perineal cystotomy should be performed, and the bladder drained and systematically irrigated. There is no doubt that this is the true surgery of profuse hæmaturia from ruptured kidney, for such a procedure anticipates these complications. The necessity for the *early* performance of the two operations in certain cases is well exemplified in a case which is reported by Mr. Rawdon,[36] of Liverpool. A boy aged twelve, suffering from ruptured kidney, began to develop symptoms of acute cystitis, and the injured kidney was removed by lumbar nephrectomy in order to prevent the blood entering the bladder. The acute cystitis continued, and lateral cystotomy was performed four days after the nephrectomy—the twenty-first day after the injury. Death took place, however, on the fortieth day from left pyelo-nephritis, due to the extension upwards from the vesical focus of septic inflammation.

MOVABLE KIDNEY AND HYDRONEPHROSIS.

A distinction is drawn between a kidney *movable* in, or with its capsule behind the peritoneum, and one *floating* free in the peritoneal cavity attached by a mesonephron. Dr. Drummond[37] in recording thirty-one cases of *movable* kidney, says the most characteristic symptom was pain of an aching, dragging and burning character, aggravated by exertion and relieved by rest. The hypochondrium was the region most frequently

affected, though the pain was often described as travelling back into the posterior lumbar region, and again, up to the shoulder-blade or down towards the ovary. Not unfrequently it passed across the lower part of the epigastric region from side to side. Dyspeptic symptoms were frequently prominent in ten of the cases. As a rule there was a sense of local or general abdominal tenderness, with more or less gaseous distension, pain, constipation, and loss of appetite. The pain and general dyspeptic discomfort were at their height usually from one to three or four hours after food.

Morris[38] states (1,) That some of the most movable kidneys—those which float up to the front wall of the abdomen—cause no pain or other subjective symptom and have no mesonephron; (2,) That some of the cases in which the symptoms are most severe, most frequently recurring, and most likely to be mistaken for renal calculus rarely, and sometimes never, can be detected by clinical examination as movable. It is only since surgical explorations of the kidney have been made that this form of movement which Morris terms "cinder shifting" has been shown to exist, and to be the cause of very acute suffering. Morris says, "I have repeatedly pointed out in the operating theatre how a kidney can be moved round the tip of a fixed index finger in every direction upon the plane of the loin, though it cannot be made to fall away from the back of the trunk even by rolling the person over on his face."

Dangers of Movable Kidney.—Mr. Lucas,[39] in the course of some remarks made in July, 1891, before the British Medical Association, points out the relation of movable kidney to hydronephrosis, and is of the opinion that the latter condition may be caused by the pressure of pent up urine in the pelvis and calices. He further reports cases where nephrorrhaphy has been eminently successful in early hydronephrosis due to movable kidney.

Owing to the mobility of the organ, due to the length of the pedicle, a thorough examination of it can be made, for, if necessary, it may be slipped through the wound.

The conclusions he draws are: (1,) Movable kidney is

a condition which often leads to hydronephrosis, owing to the twisting of the pedicle, or pressure of the organ upon its duct; (2,) To avoid such danger, and to relieve the patient from pain, all such cases should be treated by nephrorrhaphy, which is a simple and safe operation; (3,) Even when hydronephrosis has already advanced, cases, in which the hydronephrosis is clearly due to the mobility of the organ, may be cured by nephrorrhaphy, and the remains of the organ saved from further degeneration.

Dr. McCoosh[40] relates two cases to show how often the symptoms resemble those caused by disease of the uterus or its appendages. In one the ovaries and tubes had been removed, in another an ante-flexion of the uterus had been remedied by divulsion and a stem pessary. Neither patient had been benefitted by these operations. Each possessed a movable kidney. A complete cure was accomplished in the one case by a bandage, and in the other by a nephrorrhaphy.

Albarran and Lequen[43] assert that if the urinary outlet is impervious, only a moderate dilatation of the kidneys occurs, since atrophy of the nephritic tissue speedily ensues. If the block is partial hydronephrosis dilatation is great.

Eger[44] first suggested that hydronephrosis might occur as a direct sequence of mobile kidney.

Terrier and Bandoim state the usual cause of intermittent hydronephrosis is a floating kidney which occasionally kinks the ureter and dams up the secretion. They assert most of the intermitting cases eventually become permanent owing to the fixation of inflammatory adhesions binding the kidney in a displaced position.

Knight,[44] in an able *résumé* of movable kidney and intermitting hydronephrosis, considers that this view is correct and that the disease has a very distinct relation with menstruation and pregnancy, the onset of menstruation being an undoubted factor in the origin of this form of hydronephrosis.

Mr. Morris[45] remarks that convulsive seizures co-existing with urine of a sp. gr. never higher than 1010, or 1012,

with a temperature often a little subnormal and with occasional attacks of vomiting or feeling of sickness, should excite suspicion as to the presence of progressive chronic degeneration of the kidney. A case of double hydronephrosis in which the above symptoms were observed, is detailed and an especial point is made of the mental change which took place. From an active woman physically and mentally, and of a cheerful disposition, the patient became a nervous, desponding, and suffering being, constantly requiring medical attention, always reclining upon a bed or couch, and subject to frequent and severe pain. Convulsive seizures were noticed before nephrectomy. The loss of energy, general apathy and changed disposition; the loss of the most ordinary confidence in herself, her dread of being left alone for fear of something terrible happening to her; and her inability to concentrate her attention upon the simplest reading, as well as the convulsive seizures, was proved to be due to insufficient renal action caused by double and extreme hydronephrosis.

Treatment.—When the suffering is severe enough to warrant operative interference, and a well-fitting renal truss does not restrain the excursions of the kidney or afford relief, then an attempt should be made to fix the kidney in its proper position. The propriety of the operation is endorsed by many: Morris, Thornton, Guyon, Küster, Langenbuch, Weir, Keen, and others. The mortality is about 2 per cent. Keen[41] collates a table of 134 cases with 4 deaths, *i.e.*, 3 per cent.—63 were permanently cured, 21 improved and 19 failed. On the other hand Mr. Lawson Tait[42] says, "I have been persuaded to perform three of these useless and unscientific operations with the result that not one of the patients have been benefitted in the least, and one of them has died under such circumstances, that I think the operation might be fairly blamed for it. I shall have nothing more to do with fixing kidneys." Most agree that nephrectomy (for movable kidney), with its 25 per cent. mortality is unjustifiable. (*Compare Nephrorrhaphy, page* 8.)

RENAL CALCULI.

Dr. Murray[46] states that belladonna is more beneficial than opium in relieving the pain of renal colic. The drug should be pushed even to its toxic stage, commencing with 40 minims of the tincture and repeating it every two hours. Harrison[47] has drawn attention to the use of boracite in aiding the expulsion and dissolution of kidney stones. His attention was first called to it by a paper by Dr. Kochler, of Kosten, who advocated its employment in cases of uric acid calculi and gravel. It is prepared (Bell and Co.) by dissolving a natural borate of magnesia, which is found at Strassfurt, in citric acid. It forms a white powder with a sourish taste, and is given in teaspoonful doses in a tumbler of warm water two or three times a day. He has tried it in several cases of impacted renal calculi which came with the view of having the stone removed by operation. He showed two specimens of stone which had been passed by two patients who had been taking the boracite for some weeks previously, for attacks of renal colic and hæmorrhage. One of the stones presented a slightly worm-eaten appearance, as if it had been exposed to some solvent action by which its loosening and ultimate escape had been facilitated. Mr. Harrison suggests that it may not only induce a person to flush his kidneys with a bland fluid by no means disagreeable to take, but that it is capable of modifying or altering the crystalline form in which uric acid is discharged, and of exercising a solvent power on some kinds of uratic stones.

The Symptoms which justify Nephrolithotomy.—Mr. Jacobson[48] sums them up as follows: (1,) *Hæmaturia* (which in rare instances is absent) is recurrent, long-continued, rarely profuse, dependent on exercise. The blood is always intimately mixed with the urine; (2,) *Pain*, (*a*,) fixed lumbar pain of a dull aching character, increased by exercise, and often subject to nocturnal exacerbations due to flatus (Morris) or urine concentration; (*b*,) radiating pain into testes, thigh, calf, and

foot; (*c*,) tenderness on deep palpation, and stabbing pain on percussion of kidney (Jordan Lloyd[49]). Tenderness, however, can be elicited on pressure in inflamed kidney. Tenderness exists in many kidneys which on operation were proved to be quite free from calculus. The stabbing on percussion is best marked in fixed cortical stone; (3,) Long-continued lithiasis or oxaluria, history of gravel, attacks of renal colic; (4,) Frequency of micturition, relieved by rest in bed, and not experienced at night; (5,) Absence of any condition like tubercular deposits in the prostate, vesiculæ seminales, etc., which will explain the symptoms (H. Morris).

The chief conditions which simulate renal calculus are: (1,)Lithiasis and oxaluria; (2,) Tubercular kidney; (3,) Pyelitis non-tubercular; (4,) Tubercular prostate (Morris); (5,) Movable kidney; (6,) Gallstones; (7,) Interstitial shrinking nephritis (West[50], Boulby[51]); (8,) Disease of lumbar spine (Wright[52]). (*Compare p.* 11.)

Notes on the Symptoms of Renal Calculus.—The only reliable data of the presence of a calculus are to be found (according to Dr. Lequen) in the careful observation of the effect of bodily movement upon the pain, and hæmaturia.

If these symptoms are produced or exaggerated by exercise and cease with repose, to be again excited by a renewal of the bodily movements, a calculus may be diagnosed. Mr. Hurry Fenwick submits that this statement is too dogmatic. Certain cases of tubercle, and also of renal carcinoma before a tumour has appeared, have been able to evoke pain and hæmaturia upon exertion.

Parenchyma v. Pelvic Stones.—Mr. Bennett May[53] divides the cases according as the stone is embedded. Thus, from an experience of thirteen cases he states that *parenchyma stones* "are mostly of slow growth, of oxalate of lime, circular or pyramidal in shape, not branched, and occur in young males. The stones are difficult to find, but the cases are the most successful —the kidney itself remains healthy even to a late

stage. The prominent feature is pain, and pus is usually absent.

"*Pelvic stones* commonly grow more quickly and to a larger size. Pus appears early and is a prominent symptom. The kidney soon undergoes structural change. Stones are easily found, but recovery is apt to be imperfect. If the pelvic stone is small and loose, it may act as a ball valve causing great destruction of kidney from intermittent backward pressure."

Mr. Hurry Fenwick[54] corroborates these statements in a clinical lecture on the clinical distinction between stones imbedded in the renal substance, and those loose within the pelvis. He gives two cases as types:—

CASE 1.—Male, thirty-six years of age, had been in several hospitals complaining of extreme renal pain, from which he had suffered for twenty years, but as his urine was normal, his sufferings were considered to be feigned or exaggerated, and nothing was attempted. His pain was situated in the kidney, and he could cover its position with the last phalanx of his thumb. It could be elicited also by percussion over the renal region, or by any succussion of the body. It came on with any exertion, even with walking. It was more severe if the quantity of urine passed in the day was small (12 oz), but relieved if the supply was normal (48 oz.). The patient had never had colic nor any radiating pain beyond a left testicular pain if the renal suffering was acute. Sometimes he suffered from great frequency of micturition in the day, and occasionally had to rise five or six times at night, passing very little at a time. He had never noticed blood in his urine. The latter was clear, sp. gr. 1020, it contained no pus or blood, and only a few oxalates were visible under the microscope. The urine contained a slight amount of albumen. A rough pointed stone which measured $1\frac{1}{4}$ inch in length and weighed $1\frac{1}{2}$ drachms was found embedded in the cortex of the lower end of the kidney. It was removed. The wound healed by first intention.

CASE 2.—Three spiked oxalate of lime calculi were removed from the cortex of the kidney of a patient aged

twenty-nine years, who remembered suffering constant pain in his right kidney even as a boy, and since childhood the same pain had continued, though sometimes he had been free for several hours. If he ran or made any sudden movement, or committed any error in diet, the pain at once increased. When it was very severe it passed into the right testicle, but otherwise it did not radiate. No matter how severe the pain was at the time, it was relieved by *lying on the affected side.* This was so marked a feature, that he has always slept on the affected side, and if by chance he turned over in his sleep on to the opposite side, the pain awoke him and caused him to turn back again. He had never had colic. He had never suffered from frequency of micturition. His urine was 1020 in sp. gr. and quite clear, but contained blood casts and oxalate of lime crystals, and $\frac{1}{16}$ albumen. His urine varied in amount from 15 oz. per diem to 48 oz. The calculi were found in a hollowed out pocket in the cortex, which was situated on the posterior surface, very nearly on a level with the middle of the pelvis. The wound healed by first intention, and the amount of urine increased to 50 oz. per diem, and became stationary.

The striking feature in these cases seems to be in the character of the pain. In the embedded stone there is constant and often acute pain, located in the kidney, rarely radiating unless it is very severe, and then to the testis of the corresponding side. The patient cannot lie on the *unaffected* side. Colics are usually absent. In the loose pelvic stones we encounter the typical renal colics with the radiation to the shoulder and leg.

There is usually also, I believe, a higher specific gravity in the urine of an imbedded stone than in that secreted by one which evokes intermittent colics. Probably the backward renal pressure exerted by the ureteral obstruction would account for this difference. *Albumen* and *blood-casts* are found in these cases, and the patient is sometimes diagnosed to be suffering from Bright's disease, or the surgeon objects to operate because of the presence of albumen and casts. The latter

probably proceeds from the kidney in the immediate neighbourhood of the stone, and should not deter us from operating.

FAILURE TO FIND RENAL STONE IN CASES IN WHICH CALCULOUS SYMPTOMS WERE PRESENT.

Mr. Henry Morris[55] records an experience of twenty-eight cases, in which renal calculus was suspected, but in which none could be discovered even on very thorough exploration. In twenty-seven of the cases the lumbar incision was employed, and in one the Langenbuch anterior incision was preferred.

In considering the twenty-eight cases, the following groups were adopted: (1,) Tuberculous nephritis and pyelonephritis, two cases; (2,) Abscess of the kidney, five cases, all males. Three were tuberculous, one occurred after stricture, and one after gout; (3,) The effects of former perinephritis caused by sprains or injuries to the back, four cases; (4,) Movable kidney; (5,) Abscess of prostate; (6,) Calculus of prostate; (7,) Calculus in the lower end of the ureter; (8,) The effects of a stone which has passed along the ureter; (9,) Renal calculus simulated by disease in the neighbouring organs, such as the cæcum and stomach; (10), Spinal disease, which has caused perinephric suppuration; (11,) Undetected renal calculus; (12,) No sufficient cause discovered.

An analysis of the cases shows that in twenty, some morbid condition of the kidney or the perinephric tissue was found. In another case nothing was discovered at the first exploration, but a stone was present, and was subsequently removed with the kidney. In the twenty-second case the stone was not found, though it is no doubt there, and considering the present state of the patient, ought to be again searched for now that the method of search is so much more perfect. In six cases nothing abnormal was found in the kidney or its surroundings. but in two of them organic disease affected the prostate and other parts of the lower urinary appara-

tus. In one the symptoms were excited by a gastric ulcer, and in the other three no explanation of their symptoms is afforded by anything at present known about the patients.

In three of the cases in which some pathological condition was found, there was grave disease in other organs as well. In one a movable kidney probably caused the whole of the symptoms; in another the mobility of the kidney explained only part of the symptoms, the rest being caused by a calculus lower down. In fourteen of the cases complete cure followed the operation; and in another life was prolonged for nearly three years, and great relief from suffering secured by the operation. Tiffany[207] quotes twenty-one instances of failure. *(Compare Neuralgia of Kidneys, page 21.)*

The following hints are valuable:—

In suspected renal calculus, one of the errors of diagnosis to be borne in mind is the possibility of the symptoms being caused by ulcer of the cæcum, duodenum, or stomach, or by some other form of intestinal affection.

Calculus of the prostate is said by Mr. Morris to simulate renal stone, and an occasional difficulty must occur in detecting a stone in the prostate, even with one index-finger in the prostatic urethra, and the other in the rectum.

In all cases of renal calculus, the least doubtful, it should be a rule to examine the prostate and vesiculæ seminales per rectum, and to sound the bladder. While exploring for stone in the bladder on these occasions, Mr. Morris pushes his left index-finger as far as he can into the rectum to drag downwards and forwards the trigone of the bladder, so that the ureteral orifices may come well within the play of the beak of the sound.

RENAL CASES OF EXCEPTIONAL INTEREST OR DIFFICULTY.

Nephrotomy for Calculous Pyelitis, with disease of the opposite kidney.—Professor Keen[56] reports a very instructive case of calculous pyelitis in a young woman, aged

thirty-one. As the urine was found to have a small urea percentage, nephrectomy was decided against, and nephrotomy was performed. The kidney was found to be greatly dilated, and the renal mouth of the ureter was seen by means of electric light to be blocked by two small calculi. As they could not be dislodged without free hæmorrhage, and as the patient had been greatly weakened by previous suffering, the calculi were left *in situ*, and the sac stitched to the skin. The remarkable part of the case is, this apparently destroyed and almost useless kidney secreted four and a-half times as much urine as the other kidney. The patient died probably from hæmorrhage, thirty-six days after the operation. Unfortunately no autopsy was obtained. Professor Keen considers that no nephrectomy ought to be undertaken unless the percentage and the total amount of urea have been determined. If this percentage be below 2 per cent., nephrectomy should not be done until the kidneys have been stimulated to do their work, so that they eliminate at least this percentage of urea.

Left Nephrectomy, typical right Renal Colic with Suppression.—Repeated Explorations.—Autopsy revealed kink in Ureter due to fibrous adhesions with Cæcum.—Mr. Howard Marsh[57] relates the following very important case:—A female, aged twenty-five, with symptoms of left renal calculus, had the left kidney removed in June, 1886. It was found mobile, atrophied, and it contained three small calculi, which could have been passed by the natural route. The patient made a good recovery, and was discharged in September, 1886. A month later, and again in December, the patient was readmitted with a pain in the right kidney. In the latter month there was typical renal colic, with almost total suppression of urine. In January, 1887, the right kidney was explored, but nothing was discovered. The symptoms subsided, and the patient went on well until December 1889. During this time, however, she had occasional attacks of pain, hæmaturia and partial suppression of urine, and in January, 1890, she was admitted again after one of unusual severity. For some

days after this she had partial suppression of urine, and occasional attacks of severe suffering; and these recurred at intervals until July, when the kidney was again exposed by an incision through the right linea semilunaris. The kidney seemed healthy and moderately hypertropied; there was no dilatation of the ureter. Matters then went on as before with occasional attacks, until on February 14th, 1891, the kidney was again explored, and the ureter was opened two inches below the pelvis of the kidney, and a long probe passed down it. No obstruction, however, was found. The substance of the kidney was then incised, so that the pelvis and calices could be explored with the finger, but still nothing was found. The patient gradually sank and died on the 17th. *Post-mortem:* An opening was found in the cæcum, due to ulceration of the vermiform appendix. The right ureter was a little dilated, and bound down by fibrous bands to the cæcum. The right kidney was large and pale, but otherwise normal. The mischief in the appendix had probably occurred in the previous November, when there were symptoms of perityphlitis.

Mr. Day[58] has removed a large right renal stone, weighing 1331 grs. from a woman, aged thirty-two. The symptoms had existed fourteen years, and they consisted in occasional pain in the right loin, lasting perhaps three days, with intervals of complete freedom. Apparently a right renal tumour had only been noticed a year, and coincidently with its appearance was the change of the urine to a thick and slimy condition. The right lumbar incision was made, and the stone which was mainly phosphatic was successfully removed in two sittings. Probably this is the largest calculus removed from the kidney.

Fatal Hæmorrhage in Nephrolithotomy.—Mr. Rickman Godlee[59] records a case in which a large calculus was removed first from one kidney and a second afterwards from the other. In the latter operation no bleeding ensued on the first incision into the kidney, but the laceration which was caused by the removal of the stone gave rise to very free venous hæmorrhage, and though it

subsided at the completion of the operation, it recurred fatally an hour and a half afterwards. Mr. Mayo Robson[60], mentioned a similar case, in which the hæmorrhage was so violent that he excised the kidney in order to save the patient's life, and he alluded to another but fatal similar case which had come to his knowledge. Mr. Arbuthnot Lane[61] has stated he had controlled severe hæmorrhage after incision into the kidney by sutures passed through the renal substance.

Statistics.—Mr. Turner[61] mentions that of forty-three cases of renal calculus described in the post mortem records of St. George's Hospital for the past twenty-one years, nineteen were cases of multiple stones. Both sides were affected in nine instances only. Of these, two had been operated upon for calculous suppression of urine. Of the one-sided cases the calculus was on the right side in seventeen, and on the left in fifteen. Pyonephrosis was present in twelve cases. In nine the ureter was completely blocked, and in eight of these the obstruction was at the renal end. With regard to the condition of the unaffected kidney in those cases in which only one side was calculous, it was granular and cystic in nine, lardaceous in two. There only remained eight cases in which the other kidney was either healthy, hypertrophied, or normal. He submitted that the two points to be considered in the prognosis after operations upon the kidney were: (1,) The local condition as to the presence of pus; (2,) The condition of the other organ. He thought that in a very large proportion of the cases the other kidney, if not actually calculous, would be granular or undergoing some other form of degeneration.

NEPHRO-INTESTINAL FISTULÆ.

It would appear that fæcal communication with the pelvis of the kidney shows a decided tendency to heal after nephrectomy has been performed for the removal of the renal suppuration which has provoked the fistula into the bowel. Thus, Whipple, Davidson, and Keyes, record cases in which temporary fæcal fistulæ communi-

cating with perinephritic abscesses healed spontaneously after nephrectomy. Keyes[62] mentions a case in which the fæcal communication with the pelvis was so free that bubbles of intestinal gas, together with bits of fæcal matter, were passed constantly *per urethram*. Nephrolithotomy was performed, after which the fæcal opening closed spontaneously.

TUBERCULOSIS OF KIDNEY.

Lumbar pain, frequent micturition, hæmaturia, and colic, are symptoms common alike to tubercular kidney and renal stone. It is therefore extremely difficult in the earlier stages of the former disease to form a differential diagnosis. The chief aids are: (1,) Pyuria appears early in tubercular disease, urine being strongly acid at first. The sediment contains caseous *débris*, in which the bacillus tuberculosis may be found; (2,) Frequency of micturition is nocturnal and not relieved by rest; (3,) Intermittent rises of temperature are often observed early in the case; (4,) Early exploration clears up the diagnosis and may arrest the disease by free incision and drainage (Knowsley Thornton), or allow of nephrectomy (Jacobson). In the later stages nephrectomy is of no value. Madelung (Rostock) and many others give successful cases in which tubercular kidneys were removed by the extraperitoneal route.

TUMOURS OF THE KIDNEY.

Villous Tumour of the Renal Pelvis.—A case of this very rare disease has been operated upon by Mr. Thomas Jones,[63] of the Manchester Royal Infirmary. The patient was a man aged fifty-five. The one prominent symptom in the case was the free hæmaturia, which had continued without interruption since the commencement of the attack, eighteen months previous to the man's admission to hospital. He removed it with the finger and a Volckman's spoon, the surface from which it was dislodged being smooth, clean and vascular. The patient made a good recovery. Harrison[204] and Thornton[205] record similar cases.

Tumour of kidney.—Mr. Edmunds[64] describes a cystic adenoma of kidney, the product of a nephrectomy in a girl, aged eighteen. On examining the kidney after removal, there was found projecting on its anterior surface a globular tumour; on section, this was seen to be two and a half inches in diameter, and to project internally into one of the calices. The mass, which was enclosed in a distinct capsule, was found to consist entirely of cysts of various size, the largest being one inch across. These cysts contained a thin colourless fluid, and, on microscopic examination, they were found to be lined with epithelium, at places cubical, at others columnar. The remainder of the kidney was healthy, and no doubt working up to the time of operation. *(For the most recent treatment of such cases compare Tuffier, page 19.)*

Mr. Bland Sutton[65] in an able clinical lecture on the subject of Renal Tumours, of which the following is a synopsis, asserts that the removal of renal sarcomata from infants is a useless proceeding, The records of twenty-one operations show the following results :—Nine recovered from the operation and twelve died. The nine which survived nephrectomy died within a year of the operation, from recurrence ; half of them were dead within six months. Many of these operations were carried out by surgeons famous for their operative skill, and the records were collected from British, American, French, and German periodical literature. Children under five years of age bear operations on the viscera badly.

The results obtained by Abbe[66] in two children—one two years old and the other one year and two months—rather militate against the acceptance of this statement.

The consideration of renal sarcomata in adults is complicated in an unexpected manner, for it is now clear that certain tumours, thought to be of renal origin, really arise in the adrenals (supra-renal capsules), and some probably originate in "accessory adrenals" embedded in the cortex of the kidney. Therefore in

considering supposed renal sarcomata in adults we must distinguish betweeen :—

(1,) Renal sarcomata ;
(2,) Adrenal tumours ;
(3,) Accessory adrenal tumours.

Renal sarcomata in adults are usually composed of spindle cells. They are most common between the ages of thirty and fifty years. One kidney only is attacked. The tumour grows rapidly, gives rise to frequent attacks of hæmaturia, and often causes great local pain. The kidney attains the size of a child's head, and secondary deposits occur in the lungs and liver. Death is due to exhaustion, which is often greatly increased by the anæmia induced by the hæmaturia.

Treatment.—As in infancy, nephrectomy in adults for sarcoma is attended with a high mortality, and the duration of life in successful cases is rarely prolonged beyond a year. In adults, however, nephrectomy is occasionally performed to relieve the pain which many of these patients suffer. Mr. Sutton has collected the records of fourteen cases of nephrectomy for renal sarcomata by British operators : there were six recoveries and eight deaths. Those which survived the operation died within twelve months.

ADRENAL TUMOURS.

The adrenal (supra-renal capsule) may become transformed into a large tumour much in the same way as the thyroid gland becomes a goitre : such tumours closely simulate the clinical features of renal tumours. Like sarcomata of the kidney, they occur during infancy, and at this period of life are usually bilateral. Our knowledge of adrenal tumours in children is at present entirely derived from the *post-mortem* room. In the adult, it would seem that they are unilateral, but they may attain a very large size (twenty pounds). In structure they are identical with the zona fasciculata of the adrenal.

Although in situation and from physical signs it is impossible to distinguish between a renal or an adrenal

tumour, it has been pointed out that the hæmaturia, which is such a constant sign in renal sarcomata of adults, is absent in tumours of the adrenal.

The surgical treatment of adrenal tumours is very encouraging. Thornton removed two of these tumours, one from a woman fifty-three years of age which weighed eleven pounds; she was alive and well six years later. The other was from a woman thirty-six years of age and weighed about twenty pounds; this patient was alive and well one year afterwards.

ACCESSORY ADRENAL TUMOURS.

It has long been known that accessory adrenals are by no means uncommon; also that certain small yellowish nodules occasionally met with in the cortex immediately beneath the capsule of the kidney (often mistaken for fatty tumours of the kidney) exhibit structural characters indistinguishable from the zona fasciculata of the adrenal. The interest in these little bodies has been considerably quickened since it has been observed that large tumours, often confounded with sarcomata, are sometimes found growing in connection with the kidney, but being structurally identical with the zona fasciculata of the adrenal. These tumours have a yellowish-white colour on section, and exhibit a radiate appearance, the uniformity of which is here and there interrupted by extravasations of blood.

It is difficult to indicate any clinical signs of value in differential diagnosis of these tumours. Occasionally they cause hæmaturia, some are the source of great pain, and there is reason to believe they give rise to secondary deposit. So far, all the known cases have occurred in adults over forty-five years of age.

EPITHELIOMA OF THE KIDNEY.

Terrillon reports the removal of an epithelioma of the kidney from a female aged forty-five, with maintenance of cure for two years.

SYPHILIS OF THE KIDNEY.

Dr. Israel[67] reports two cases in which, contrary to the teachings of works on surgery, syphilis of the kidney occasioned a tumour which led the surgeon into error. Two forms may be encountered—interstitial nephritis and gumma.

CASE 1.—A girl, aged twenty-three, after increased thirst, stomach cramps, and frequency of micturition, suffered from continuous pain in the back which was, later on, localized to the right side. There was loss of flesh, and a tumour developed in the right renal region. Anti-syphilitic treatment was instituted, and appeared to give good results for a time, but as collections of flattened cells, agglomerated into rounded masses and surrounded by a species of girdle composed of fusiform cells, began to appear in the urine in the form of a whitish deposit, an exploratory incision was made, and the kidney was found so altered that it was finally extirpated. Recovery was rapid. Examination of the kidney showed the tumour to consist of syphilitic interstitial nephritis, with hyperplastic peri- and para-nephritis.

CASE 2.—A male, aged thirty nine, with syphilitic and malarial antecedents, complained of a continuous pain on the left side, with swelling at the tenth rib. An abscess of the spleen was thought of, and an incision was made, releasing a yellowish curdy white material, but no pus; a fistula remained. The kidney was finally diagnosed as tubercular and was extirpated. The microscopy revealed gummatous degeneration without a trace of tubercle.

OBSTRUCTIVE ANURIA, MECHANICAL SUPPRESSION OF URINE.

(*Compare Diseases of Ureter, page* 54.)

The most striking and important advances in renal surgery consist in operations for the relief of obstructive suppression of urine. A distinction must be drawn between obstructive suppression in which relief and even

cure can be accomplished by the operative removal of the block, and septic suppression in which at present operative interference is useless. In the successful cases on record of cure, the obstructive suppression is usually due to the sudden blockage of a ureter with stone, in patients in whom only one kidney is working.

Such cases occur sometimes after nephrectomy, and no case could illustrate so forcibly the after risk of nephrectomy, or the value of surgical interference in total suppression due to calculous blockage, as the patient showed at the Royal Medical and Chirurgical Society by Mr. Lucas.[68] A woman aged forty-two came under his care in June, 1885. She had suffered from hæmaturia for seventeen years, with pain on the right side of the abdomen; and for seven years a tumour had been palpable on that side, recognized to be the kidney. This was removed by lumbar incision in June, 1885, and found to be completely disorganized and filled with calculi. For three months she remained well; and then towards the end of October in the same year she was suddenly seized one evening with violent and agonizing pain in the back and left loin. She passed a little urine soon after, but none subsequently; vomiting set in in about half an hour. The vomiting and anuria continued, and on the fifth day from the onset of pain she had become drowsy and weaker, so that it was difficult to get her to answer questions. The pulse was weak and the temperature 99°. Ether being given, Mr. Lucas cut down on the left kidney, and discovered a conical stone acting as a ball-valve to the top of the ureter. It was three-quarters of an inch in length, and from three- to five-eights of an inch in diameter. Urine began to drop away out of the wound as soon as the kidney was opened, but the pelvis was not much dilated. For twelve days all the urine came through the wound; then an ounce and a half was passed from the bladder with much pain, and the quantity gradually increased, until a week later all was passed by the urethra. The wound did well, and was completely healed in ten weeks. The patient has since enjoyed good health for a period of five years.

Another and somewhat similar case is recorded by Willy Meyer[69] who reports a case of nephrotomy for the relief of sudden suppression of urine occurring thirty-eight days after nephrectomy for pyonephrosis. "At the second operation the remaining kidney, which was on the left side, was exposed by the lumbar incision. The organ was not enlarged, but of a purplish red colour and much congested. The pelvis and renal tissue were explored with a needle at several points, but no concretion could be felt. After enlargement of the wound the ureter was opened, emptied of a mass of pus, shreddy material, and coagulated blood, and repeatedly washed out with a warm boric solution which was forcibly injected with a hand syringe. The renal pelvis, which also contained similiar material, was cleared by gentle irrigation. The wound was loosely filled with iodoform gauze, the incision in the pelvis of the kidney and the ureter being left open. The kidney at once resumed its work. The patient had a relapse four weeks after the operation, and for the next two months all the urine was discharged through the lumbar fistula. Subsequently there was a free discharge by the bladder, and the opening in the loin closed completely. After an interval of about eleven months the patient was in good health and passing daily a normal amount of clear urine.

Meyer has drawn the following conclusions from his study of this and the few previously recorded cases of total suppression of urine after nephrectomy: (1,) Before nephrectomy, cystoscopy should, if possible, be performed in order to prove the presence of a working opposite kidney; (2,) If the cystoscope has demonstrated the presence of a working opposite kidney, and if then absolute anuria suddenly sets in some time after nephrectomy and a period of uninterrupted recovery with the secretion of a satisfactory amount of urine has existed, the cause must be a mechanical one. Nephrotomy on the opposite side is then indicated as the only means of saving life; (3,) Immediately after nephrectomy there is, in all probability, an acute hyperæmia of the opposite kidney.

This hyperæmia frequently occurs in the female, especially in the left kidney, at the time of the menstrual period, but probably to a much less extent; (4,) Such hyperæmia may suddenly aggravate an incipient or hitherto entirely latent disease in the remaining kidney. It may even cause the perforation into the renal pelvis of an abscess previously encapsuled in one of the pyramids; (5,) Such an aggravation of disease in the remaining kidney may be repeated at a number of menstruations, but is, in the majority of cases, of a passing, not of a permanent, character. After such attacks the remaining kidney often shows an improved condition.

A very remarkable case of calculous pyelitis, with complete suppression of urine for seven days, relieved by operation, is recorded by Dr. A. T. Cabot. A male, æt. sixty, who had suffered for seven years from renal colic of both sides, was suddenly seized with pain in the left kidney and total suppression. The anuria continued for three days, when a catheter was passed, but only one drachm of turbid urine was obtained. An examination was made, but nothing could be detected except a prostate of moderate size. At the end of the seventh day his condition was as follows: The patient was quiet and did not at all look like a sick man. "There was no nausea, no headache, no drowsiness; in fact, he said he felt perfectly well. There was no tenderness anywhere, even on considerable pressure. His tongue was dry. Pulse 76, of fair strength." In view of the total suppression of urine accompanying the attack of pain in the left side, it was thought probable that the right kidney had previously been rendered useless either by destruction of its secreting apparatus, or by blocking of its ureter, and that now a calculus had shut off the secretion of the remaining kidney. It was decided to explore. On the morning of the operation (between seven and eight days after the establishment of complete anuria), the patient began to show evidences of constitutional disturbance, the pulse and temperature rising, and there was a commencing mental hebetude. Both kidneys and ureters were examined by the hand through a median abdominal

section, but though the right was enlarged, the left was healthy, and no blocking calculus could be detected on either side, and the operation was abandoned. Three hours after a copious diuresis ensued, two gallons being secreted in twenty-four hours. A fortnight after, a few grains of calcareous material were removed from the bladder by means of a stone evacuator, thus completing the evidence that the ureter had been stopped by a calculus which had been displaced by manipulation during the operation.

The fact that the pelvis of the left kidney was not distended with urine seems to show that the function of this organ was stopped by an inhibitory action due to the irritation of the calculus in that ureter, and was not due wholly to the obstruction to the flow of urine, and to the back pressure exercised by this obstruction. This cessation of the secretion of urine in this kidney should explain the short duration of the pain, when this ureter was blocked. The patient recovered.

The following conclusions are drawn from this case, and a consideration of the literature :—

(1,) That in a calculous patient, or in a patient with a distinct attack of renal colic, the suppression of urine should be regarded as directly due to the stone—and in the majority of cases both kidneys will be found to be disabled—for the cessation of the functions of a healthy kidney due to irritation of a stone in the opposite ureter must be very rare.

(2,) These cases should be treated by operation as soon as it has been found that the function of the kidney has come to a standstill, as there is little chance of a stone being pushed along the ureter when the kidney is no longer excreting urine behind it.

(3,) In the absence of any evidence as to the location of the calculus, the first step in such an operation should be a median laparotomy with the hope of discovering the whereabouts of the stone in order to proceed intelligently for its removal.

(4,) Massage of the ureters and pelves of the kidneys from above downwards should be practised, if no calculus

can be found, in the hopes of dislodging or breaking up a small calculus if such exists.

OTHER CASES.—Cullingworth, *Trans. Path. Soc.;* Terry, *American Journal Med. Science, Phil.*, vol. 97, p. 597; Berg, *Centralblatt für Gynækologie*, Leipzig, Jan. 28.

Mr. Hurry Fenwick was summoned to a case of complete suppression, apparently septic, which had lasted three days. Much pain was complained of in the right kidney. The bladder was empty. The patient was too exhausted to allow of severe or prolonged operation. A small lumbar incision exposed an enormously congested kidney, from which ten ounces of blood was allowed to flow through a capsular incision, and the wound closed. The relief was immediate; fifty ounces of urine were passed voluntarily in the next twenty-four hours, and on the next day after about the same quantity, but the patient succumbed, and on post-mortem an angular stone was found impacted in the ureteral orifice of the right kidney. The left kidney was atrophic and useless. The backward congestion had evidently been so far relieved as to permit of the escape of urine by the sides of the disengaged angular stone. Had the operation been undertaken earlier, there is no doubt a search would have been attempted, and the stone in the ureter discovered and removed.

TREATMENT OF RENAL INSUFFICIENCY.

The subject of renal insufficiency is of so much importance in all operative interference in the urinary organs that it is introduced here.

Dr. Ralfe[70] collates and criticises an important paper by Professor Dujardin-Beaumetz[71] on this subject.

Professor Dujardin-Beaumetz says we are not to attach too great an importance to the quantity of albumen, but to rather divert the attention to the proportion of solid matters, and the presence of toxines in the urine. In cases of renal insufficiency there are two indications to fulfil—to favour as much as possible the elimination of the toxines accumulated in the economy, and to reduce to a minimum the amount of these introduced by food, or

which result from the processes of assimilation or dis-assimilation. To meet the first we have to employ purgatives, sudorifics, and diuretics. At the head of the latter Professor Beaumetz would place digitalis and digitaline; next to these strophanthus. Though some authorities have declared strophanthus causes nephritis, he has never seen such an effect produced, and he has obtained certain beneficial results from the drug in cases of renal insufficiency, whenever the alterations of the kidney structure have not been great. Sparteine, adonis, and convallaria, hold only a secondary place as diuretics, but caffeine holds a preponderent place; it has moreover, the advantage of being suitable for administration in hypodermic injection, for which the following formula is useful:—

℞ Pure caffeine
Benzoate of sodium ... āā 2 grammes.
Boiled water ... ... 6 grammes.

Inject a full syringeful two or three times a day. By the side of caffeine theobromine should be placed, which according to Gram has a powerful diuretic action, more especially when employed as the salicylate of theobromine, though Germain Sée denies the possibility of the solubility of theobromine in salicylic acid. Kola, too, possesses undoubted diuretic powers, which it owes to the caffeine and theobromine it contains. To these diuretics we may now add a group of substances which belong to dietetics—the lactoses and glucoses. Use can be made of either of these sugars, and if not tolerated by the stomach they can be injected by the rectum. Quite as important as diuretics in cases of renal insufficiency are purgatives. Every patient so affected should have two or three stools daily. To obtain this result any laxative, Professor Beaumetz thinks, may be used, so long as the laxative selected is adapted to the intestinal tolerance of the patient. Since the skin may be considered an external kidney, it is necessary to promote its functions to aid in the process of elimination of toxic principles from the economy. But it often happens, in spite of all efforts to effect elimination by

diuretics, purgatives, or sudorifics, we are unable to get rid of the toxines accumulated in the blood, and symptoms of poisoning by them become more and more pronounced. We must then have recourse to inhalation of oxygen, which augments the vitality of the red corpuscles and causes the transformation of these toxic principles. Blood-lettings, either local or general, are also of service, though they must be regulated by the strength of the patient, and are useful since they actually withdraw a certain quantity of poison accumulated in the blood. When the patient is very feeble, recourse may be had to transfusion. In order to prevent the formation and accumulation of toxines, attention must be paid to hygienic measures. The first hygienic indication is to control as far as possible the integrations and disintegrations connected with the exercise of the organic functions. Patients, therefore, suffering from renal insufficiency should avoid fatigue, and all overwork, physical and mental. The second indication consists in regulating the digestive functions, with a view to arresting the vicious fermentations that occur there. For this we should employ intestinal antiseptics, such as capsules of salicylate of bismuth, with or without the employment of naphthol or salol. Lastly, with a view to reduce to a minimum the toxines contained in aliments, the patient should be subjected to a vegetarian regimen, that is to say, live exclusively on milk, eggs, starches, green vegetables, and fruits. If meat should be ordered it must be well cooked, since cooking destroys the elements of putrefaction. Game, mollusks, crustaceans, fish, old cheeses, must be absolutely forbidden, because these substances contain ptomaines. Professor Beaumetz specially insists on those ptomaines developed by putrefying fish as more rapidly produced and most toxic. The patient should never drink spirits nor pure wine, but may take milk, beer, or extract of malt. The above regimen only applies to cases of little intensity; when the symptoms of uræmic poisoning are menacing then there is but one alimentary substance applicable—milk.

SURGERY OF THE URETERS.

ELECTRIC LIGHT INSPECTION.

Inspection of the vesical orifices of the ureters, to ascertain if a symptomless hæmaturia or pyuria is of renal origin, is now possible in either sex by means of the electric cystoscope (see Electric Illumination of Bladder, p. 124). Mr. Hurry Fenwick[72] draws attention to this subject, and gives the cases in which jets of bloody urine could be seen issuing from the vesical orifices of the ureters, thus establishing at once the diagnosis of the renal source of the hæmorrhage.

In the female this had been effected in 1883, by Dr. Newman,[73] of Glasgow, by means of an incandescent lamp of his own construction.

UNILATERAL PYELITIS FROM PRESSURE OR FROM ASCENDING INFLAMMATION.

In cases of unilateral pyelitis, and perhaps in the bilateral form of this disease, when the drain is commencing to affect the general health of the patient, the ureter may be attacked and washed out either from below or above. Surgery is extending in this direction. There is no doubt, however, that the procedure now in vogue of nephrectomy for incurable unilateral pyelitis is unsurgical and unnecessarily severe, for the kidney which is removed is perhaps, working satisfactorily and sufficiently well, and the ureter, which is the *fons et origo mali*, is left behind. It is true that when the tide of urine is cut off by nephrectomy the diseased channel is placed in a state of physiological rest with ample drainage, and should therefore heal, but the cure is accomplished at the expense of serious mutilation.

Systematic Irrigation of the Ureter from above.—The safety with which the pelvis of the kidney can be opened, the ease with which bougies or blunt-pointed catheters can be passed down the ureter from above, and the facility with which this canal can be washed out through the loin, permits us to hope that the treatment of unilateral pyelitis by systematic drainage from above will before long be an accepted and well-established procedure.

In the female, catheterisation of the ureters has been and can be done without a cutting operation, though for continous irrigation of these canals the Bozemann operation is apparently the best (*vide* p. 51). Thus Simon in 1875 practised direct catheterisation through the dilated urethra. Grunfeld in 1876 used Simon's method with the help of an endoscope. Paulik of Vienna claims to be able to be guided by certain folds in the bladder, and does not dilate the urethra. He has succeeded in passing hollow sounds into the ureters one hundred and fifty times in the dead subject and fifty times in the living.

Dr. Newman, of Glasgow,[74] in 1883 devised and used an electric endoscope for the female bladder, and found when the bladder was well illuminated the orifices of the ureters were easily seen and could be catheterised.

It has been said that the ureters can be catheterised under the electric light of the cystoscope. Dr. Brenner has attempted to catheterise the ureters by means of a modification of the cystoscope, which carries a separate small channel on the convex side of the shaft. This channel terminates just below the window, and can also be used for changing the water in the bladder. It is occluded by a mandrel, when the instrument is introduced. The mandrel later is extracted and replaced by a minute English catheter or an elastic metal sound. Brunner thus succeeded in pushing the catheter into each ureter of a female patient exposed by the light, but failed to do the same in the male. He has had no opportunity to continue his trials in this direction. When the catheter or sound is in the ureter, the instrument itself may be slipped back over it. Dr. James Brown,[75] of Baltimore, by adapting a spring stylet to Brenner's

BOSTON MEDICAL LIBRARY
FEB 15 1921
LIBRARY

instrument, claims to have been able to have entered the ureters in two cases in the male sex without especial difficulty, and to have collected the urine from either kidney.

It has been proved further that the ureteral canals tolerate the sojourn of catheters. Schede in a case of uretero-vaginal fistula left catheters in the ureters for seven days. Messrs. Albarran and Lluria[76] assured themselves by experiments on dogs that catheters could be left in both ureters for many days without producing any renal resentment. They applied their method to a woman suffering from tuberculosis of the bladder, in order to leave the bladder at rest, and the catheters remained in the ureters for ten days.

The next step was to prove that washing of a pyelitic canal can be curative.

Bozemann[77] was, I believe, the first to draw attention to the treatment of chronic pyelitis by irrigation through a wound exposing the orifice of the *female* ureter by an incision through the bladder base (kolpo-uretero-cystotomy).

He gives a remarkable instance of a woman, aged thirty-four who in the fourth month of her last pregnancy (fifth) began to suffer pain in the right lumbar region. It was variable in character and increased by exercise; at times it was acute and radiated to the groin, and down the thigh toward the knee. More frequently the pain was dull and constant, and confined to the lumbar region. The urine was constantly stained with blood, and deposited much pus. Partial suppression of urine, severe paroxysms of pain, nausea, vomiting, and high fever had accompanied the passage of two calculi. The general symptoms had lasted three years when the patient came under Dr. Bozemann's care. She was much emaciated; her complexion was sallow, and her mucous membranes very pale. She was extremely weak, and suffering almost constant pain in the region of the right kidney. The urine was of a reddish colour, acid in reaction, contained albumen, and deposited a thick sediment consisting of blood and pus. The uterus was large, retroverted, and slightly prolapsed.

"On May 6th the patient was anæsthetized, placed on the left side, and the anterior wall of the vagina exposed and made tense by means of my dilating speculum and perineal elevator. The point of a narrow-bladed scalpel mounted in a long handle was made to enter the mucous membrane on the right side about one inch and a quarter below the cervix uteri, and three quarters of an inch away from the median line, and a circular piece of the septum was removed, forming an opening into the bladder sufficiently large to admit the index finger. The orifice of the ureter was then discovered, and bloody urine was seen issuing from it. The vesical and vaginal mucous membranes were brought together at the border of the opening with a continuous catgut suture. A No. 8 French olive-tip catheter was then passed into the ureter, and entered the pelvis of the kidney without meeting any obstruction. Warm water was now injected through the catheter by means of a small piston syringe. About a drachm at a time was forced into the pelvis of the kidney, and then allowed to escape. The irrigation was continued, until the fluid which came away was free from blood. The catheter was left in place for thirty-six hours, and the urine was collected as it flowed directly from the pelvis of the kidney. When examined by Dr. Coe, the pathologist of the hospital, it was found to be alkaline in reaction, and to contain a large proportion of blood, pus, and crystals of triple phosphates. Bacteria were also present in great numbers. A week later the catheter was again introduced, and allowed to remain twenty-four hours. Its continued presence in both instances occasioned nausea and vomiting, and a good deal of paroxysmal pain.

"The vesical and vaginal mucous membranes having united at the border of the opening by first intention ten days after the operation, systematic treatment of the pyelitis was begun. Every day a flexible olive-tip catheter was passed into the ureter, and the pelvis of the kidney was irrigated with a warm solution of bichloride of mercury, 1 in 20,000. A rubber tube was attached to the lower extremity of the catheter, in order to lengthen

the instrument and to connect it to the nozzle of the syringe more readily. A small hard rubber syringe was used. At first I injected only about one drachm at a time; afterwards I found that the best guide as to the quantity of fluid which should be injected was the sensation of the patient. Whenever the pelvis of the kidney was distended, a peculiar and characteristic pain was felt; the fluid was then allowed to escape, and the injection repeated until the washings were colourless and free from sediment. As the treatment progressed the size of the catheter employed was gradually increased to a No. 13, and, if any useful purpose would have been served, I believe I could have dilated the ureter to a much larger size. As a result of the spiral course of the ureter, the catheter as it entered rotated on a longitudinal axis. A given point on its service, indicated by a mark, was seen to describe a complete circle. As the catheter passed toward the pelvis of the kidney, this point moved from right to left, and while the instrument was being withdrawn the rotation took place in an opposite direction. I have verified this observation in other cases, and found that in the left ureter the direction of the rotation of the catheter is reversed. Whenever the catheter was passed, the urine retained in the pelvis of the kidney flowed out. The quantity thus removed was found to be variable. If the patient had been standing or walking immediately before the introduction of the catheter in the left lateral prone position, there was found little or no accumulation of urine in the pelvis of the kidney; if she had been lying down, a considerable quantity was removed. At the beginning of the treatment this was sometimes as much as fifteen drachms. I was also able to measure tne capacity of the pelvis of the kidney. The injection of fluid was continued, as already described (but with a larger syringe), until the peculiar pain was felt. The fluid was then allowed to escape, and measured. The capacity of the pelvis, determined in this manner, was at first twenty-one drachms, but was at last diminished to five drachms, which, from my observations in other cases, I believe to be about normal."

REMOVAL OF URETERAL STONE.

The first case in which a patient was saved from death by suppression of urine, by the removal of a calculus low down in the ureter, is a brilliantly successful one by a general practitioner—Dr. Kirkham,[78] of Downham Market.

Other cases are recorded by Twynam,[79] Ralfe,[80] Lane,[81] Bardenheuer,[82] Israel,[206] Lange, Bergmann, and Rufus B. Hall. (*Compare page* 41.)

PLASTIC OPERATIONS ON THE URETER.

Henry Morris[83] remarks: "Some of the latest developments in operating upon the higher urinary organs, relate to stenosis, valvular stricture, and valve formation in the ureter.

Plastic operations after resection of portion of the ureter, longitudinal division of stricture, transverse union of the longitudinal division of stricture and transverse union of the longitudinal wounds, and excision of the ureter (ureterectomy) in its whole length after nephrectomy for tuberculous disease, have each been performed by Küster, Christian Fluger, and Regnier. It is highly probable that one or other of the plastic operations may advantageously replace nephrectomy or nephrotomy in certain cases of moderate degrees of non-calculous hydronephrosis, more especially where there is any doubt at all about the healthy condition of the other kidney.

Resection of Ureter.—The surgery of the ureter is added to by a case recorded by Küster: A boy of thirteen had stricture of the commencement of the ureter, and consequent pyonephrosis of the same side. Nephrotomy was performed, and, as all the urine was discharged from the wound in the loin, it was inferred that the other kidney was absent. The ureter was resected at the pelvis of the kidney, and as its lower end was dilated, it was attached by stitches to the dilated pelvis, and the continuity of the canal established. The lumbar route was chosen.

Extirpation of Ureter for Pyelitis.—Dr. Paul Regnier[84]

relates a very instructive case of obstinate unilateral pyelitis. On performing nephrectomy for pyonephrosis in a young man of twenty, the ureter, which was dilated to the size of small intestine, was dissected out for some distance, ligated, and cut off. The pyelitis, however, continued, and the lumbar wound was re-opened, and the stump of the ureter was found and enucleation was commenced; twelve centimètres were, unfortunately, torn off in the effort to dissect out the tube, and the lower end retracted out of sight. The pyelitis still continued, whereupon the lower end of the ureter was attacked by a perineal incision, which exposed the vesiculæ seminales, the prostate and *bas fond* of the bladder, but the ureter was not discovered. The inguinal route was therefore adopted. The bladder and rectum were distended, the inguinal canal opened up, the peritoneum lifted up as if for ligature of the iliac artery as far as the point where the ureter crosses the iliac vessels. Here the ureter was discovered; it was dissected downwards and isolated till it was flush with the bladder; it was then ligated and cut off. The pyelitis was cured. Dr. Regnier believes that those who have stated that lesions of the ureter may be expected to disappear after nephrectomy are in error, and complete ureterectomy will have to be carried out in many cases. He advises the inguinal canal incision.

Uretero-Ureteral Anastomosis. — Howard Kelly[85] describes a case in which he severed the ureter accidentally in performing hystero-myomectomy. He performed Hook's method of anastomosis of the ureter, which had proved successful in dogs. This consists in tying the lower end of the ureter, and then making a slit into it below the ligature. The upper end is then invaginated into the lower through the slit, and fixed in that position. Dr. Kelly's case was successful. Dr. Penrose[86] implanted the cut ureter into the bladder successfully.

GRAFTING URETERS.

Trekaki,[87] of Paris, considers grafting ureters into the intestine very unfavourable, on account of the danger of

infecting the kidney, and prefers the skin. In females the vagina appears to be a very safe site.

Prolapse of Ureters. — An important subject to the surgeon, who is dealing with a supposed vesical growth, is the prolapse of the mucous membrane of the ureter. Caillé[88] gives a case of a girl two weeks' old, in whom a vulvar prolapse of the lower third of the right ureter was caused by the dragging of a intra-ureteric papilloma. The prolapse was cut away, and the child died in twelve hours.

Caillé believes this to be unique, but a similar specimen is in Guy's Museum, 2072[70], although no papilloma is present. The prolapse was cut off during life; death followed.[89] Meyer[90] has resected a prolapse of the ureter into the bladder.

SURGERY OF THE BLADDER.

Vesico-Urethral Erethism of Locomotive Engineers.—Dr. White[91] describes a neuralgic condition of the bladder and urethra to be found in locomotive engineers. It consists in irritability of the urethra, accompanied by impaired vesical power, due (Dr. White thinks) to the vibrations of the engine in motion, intensified by the narrow crutch-seat which is used. The constant series of sudden shocks or succussions soon establish an erethistic state of the muscles at or near the vesical neck, which results in a frequent desire to micturate. Stricture may co-exist and aggravate the symptoms. He recommends riding sideways upon a cushioned seat.

ON VESICAL IRRITABILITY.

Dr. A. W. Stein[91] remarks: "I would express my conviction that in a large number of cases of vesical irritability in women in which the exciting cause of the complaint is obscure, dilatation of the vesical neck affords prompt and signal relief. I do not consider it ever necessary that the dilatation be sufficient to endanger the integrity of the sphincter. I rarely exceed five or five-and-a-half centimètres, a degree of dilatation I have found entirely innocuous and satisfactory."

Treatment for Irritable Bladder.—Ultzmann[92] advises lukewarm water with tinct. opii, cocaine one-fourth per cent., resorcin one-half per cent., carbolic acid one-sixth per cent., when especially irritable. When the urine has undergone ammoniacal decomposition, solution of potassium permanganate one-tenth per cent., or three drops of amyl nitrite to a pint of water are recommended.

ATONY OF THE BLADDER.

Cases of ataxia in which the atony of the bladder has been relieved by the Motchütkovsky-Charcot[93] suspension treatment are so few that at present the success obtained thereby only justifies the trial. Catheterism is still the only method adopted, though Heddæus throws out a valuable hint of emptying the bladder by manual compression and massage. Galvanism has proved of value in atony following over-distension of the young or adult bladder, but is of questionable value in nerve lesions of the viscus. The intimate association of the ano-vesical cord centres is referred to by Mr. Hutchinson,[94] who relates the case of a man who, after an operation for hæmorrhoids, had immediate, complete, and permanent ano-vesical paralysis.

Geijtl, of Utrecht, has observed complete vesical paralysis follow the removal of tumours from the bladder.

One case of retention of urine in a female from retroversion of the gravid uterus is recorded from the Medical Mission in China.[95] Patient said she had had retention for twenty-five (?) days. A student drew off nineteen pounds (304 oz.) of urine with the catheter. The retroversion was reduced by an inflating or pear-shaped pessary. The catheter had to be used for a month, and the patient recovered.

Evacuation of the Bladder by Pressure.—Wagner[96] stated that he had noticed, in cases of vesical atony and loss of knee jerk, due to spinal disease, that the tonus of the vesical sphincter is so far diminished as to allow of the urine being expelled by suprapubic pressure.

Thus in tabes, tabetic general paralysis, polyneuritis with vesical derangement, and injuries of the spinal cord with loss of knee jerk, suprapubic pressure may be sufficient to evacuate the bladder, and the catheter need not be used. If the knee jerk be *increased*, external pressure fails to overcome the sphincter.

STRANGURY.

Benedikt[97] gives notes of two cases of strangury that were quickly relieved by applying the electrostatic

douche and sparks to the spine and hypogastrium. Previous treatment had failed to ameliorate. Case 1 was due to tabes of long duration, strangury being the most distressing symptom. Increasing relief of this condition was obtained by each application. In Case 2 the affection followed an operation for hæmorrhoids many years before. Immediately after the first sitting, the number of nocturnal micturitions sank from twenty-five to nine. A fortnight's treatment reduced the abnormal state to a minimum. More recent successful cases lead him to view this therapeutical means as a specific.

CYSTITIS.

Nodular Cystitis.—The pathology of nodular cystitis is well treated by Dr. Alexander.[98] He concludes from a microscopical examination of fifty-four bladders:—

(1,) That lymphoid nodules which occur in certain cystites are exaggerations of lymphoid foci which form a part of the normal mucous membrane of the bladder, and that the same is true in regard to nodular inflammation of the renal pelvis, the ureters, and the posterior urethra.

(2,) That when there are a great number of lymphoid foci in the normal mucous membrane, infection of the bladder, if prolonged, is likely to assume a peculiar type, due to the enlargement of these foci into prominent and very vascular nodules, and that these cystites should be regarded as a special clinical variety to which the name *Nodular Cystitis* should be given.

(3,) That in cases of tubercular infection of the bladder the numerous lymphoid foci which are present in the normal bladder become enlarged, and, as a result of the special infection, undergo degenerative changes which are characteristic of tuberculosis.

(4,) That the lymphoid foci in the normal mucous membrane vary greatly in size and number; that prominent lymphoid nodules may occur in a bladder apparently normal, and without a previous inflammation. This, however, is exceptional, and it cannot be positively

asserted whether the enlargement of the nodules in these cases is a normal or pathological condition.

The Microbe of Cystitis.—The bacterium coli commune (which originates from the gut) is stated to be most usually present in the various forms of cystitis. Dr. Wreden [99] instituted a series of experiments on male rabbits in order to ascertain the path by which the bladder becomes infected. He obtained the following interesting results, which seem to prove the inaccuracy of the theory advanced by Rovsing, viz., that infection in cystitis is due to the bacteria affecting the bladder from the vessels (bakterienembolie):—

(1,) Injuries of the mucous membrane of the anus have no effect upon the bladder.

(2,) Every injury to the epithelium of the rectum, at a level with the prostate or higher, induced cystitis.

(3,) The character and course of the cystitis thus induced depended greatly upon the degree to which the mucous membrane was wounded and the nature of the stimulus which excited the inflammation.

(4,) The bacterium of the rabbits' gut was discovered in the urine of those rabbits in which cystitis had been thus induced.

(5,) Injury to the mucous membrane of the rectum, combined with injection of fatty substances (vaseline, oil, etc.) into that canal, was followed by the microscopic appearance of these substances in the urine.

The cause of the ammoniacal urine of cystitis is still being briskly discussed. Rovsing stated that cystitis is induced by certain bacteria which occasion ammoniacal decomposition of urine. Müller,[100] from experimental researches, concludes that the bacteria producing cystitis do not cause ammoniacal fermentation of urine.

Keyes [101] remarks in a very able article on the subject, "Modern demonstration shows that suppuration is associated here, as elsewhere with the existence of micro-organisms, and due directly to their presence. But something more is necessary than the accidental encounter (as Bouchard puts it) of a man and a microbe. *The soil must be suitable*, the conditions must be

favourable, or the seed does not take root. It is an axiom, which may be safely accepted, that without microbic infection there is no suppuration in the urinary passages. Why do micro-organisms produce suppuration in some instances and not in others? In other words what preparation of soil is necessary? As early as 1873, Fels and Ritter by inoculating the bladder of dogs produced ammoniacal urine and cystitis, but only on condition of ligating the urethra—upon loosening this ligature the bladder promptly recovered its condition of health. So Guyon, Albarran, Guiard, and many others introducing pure cultures of micro-organisms into the healthy bladders of animals failed to set up cystitis unless to the microbic germ there was added other factors, such as ligating the urethra to produce forced retention, or wounding the bladder. They have also proved that neither retention, ligating the urethra, nor trauma will alone produce cystitis; but that any one of them plus the proper germ*—the bacterium coli commune—will do it.

The Treatment of Cystitis.—The use of salicylic acid in cystitis is advocated by J. P. Bryson, of St. Louis. He states that $\frac{1}{16}$ per cent. of salicylic acid is useful in cystitis when it is necessary to cleanse the mucous membrane of adherent mucus and muco-pus for the cystoscope, or for the application of nitrate of silver or thallin solutions. In many cases failure in the application of bladder washes (either as bactericides or astringents) is due in a large measure, according to Dr. Bryson, to the fact that the remedies do not reach the epithelial surface at all, and unless this precaution is taken, the surface is covered with a coating sufficiently thick to protect it alike both from the irritation of the ammoniacal urine and the medicated fluid.

Irrigation, then, should precede all curative washes. When the exudation is thin and made up chiefly of free pus, the solutions of borax, boracic acid, or chloride of sodium adequately effect their purpose; but the more chronic the inflammation becomes, the deeper it sinks;

* 4 to 6 μ long, 2 μ broad, with rounded ends—Weigert's method.

and the more it determines cell-proliferation and mucous secretion, the more useful become the salicylic acid solutions as cleansing agents.

Salicylic acid is unnecessary in acute or mild cystitis. It is contra-indicated where ulceration or a disposition to bleed is present. In tuberculosis it is distinctly harmful. It is wise after using the solution to freely wash away, with a bland injection, any which may remain behind.

Dr. Saml. Alexander[102] contributes an important paper on some mistakes in the use of intra-vesical injections in the treatment of cystites of prostatics. He makes the following statements:—

(1,) All intra-vesical injections are contra-indicated in cases of cystitis of prostatics where the inflammation is so acute that it is impossible to wash the bladder or to inject sufficient fluid to wash it without causing pain or an increased desire to pass water.

(2,) Local anæsthetics (cocaine) in the bladder are harmful because they cause congestion in the cases in which they are employed.

(3,) All injections are contra-indicated if pain is intensified by them.

(4,) As regards internal medication, Dr. Alexander insists that although diluents hold a very high place in ammoniacal decomposition of urine, yet their use is attended with this objection, that in cases of painful cystitis, where the bladder is small and tender, the too free use of diluents is apt to tease the bladder and increase the grade of congestion.

Guyon[103] recommends instillations of a solution of perchloride of mercury, 1 in 5000, in cases of cystitis, especially in the tubercular form. He reports sixteen cases of cystitis treated by this method. Eight were cured, six were greatly benefited, and two much improved. Half a drachm is the amount to begin with, increasing to a drachm. The catheter should be passed just through the compressor urethræ, and the fluid injected into the bladder. None should be permitted to escape into the anterior urethra, for here it causes inflammation. Before making an instillation the bladder must be emptied.

Mr. Hurry Fenwick advises much weaker solutions to be used at first, 1 in 10,000 or 1 in 20,000. As tolerance is obtained, 1 in 5000 may be used. In many people with chronic cystitis, the sublimate solution causes a good deal of suffering.

Tyson[104] suggests that santal oil should be administered before meals, and believes the drug "is as well, if not even better, borne than when given after food." His favourite form of injection is sodium salicylate (a drachm to the pint). He believes alum has been undervalued, and suggests it should be substituted for the salicylate in those cases in which the pus does not diminish as rapidly as is desired.

Dr. Mansel Sympson[105] states that there are undoubtedly cases where salol produces grave symptoms of collapse, and these are, he believes, "those wherein the kidneys have been extensively damaged before the cystitis occurred. They are really cases of carbolic acid poisoning." He considers salol to have very beneficial results in cystitis, and gives it in the following mixture:—

℞ Salol ʒij	Aq. cinnamoni ʒxij
Pulv. acaciæ gummi q.s.	Ft. mistura.

Sig.—ʒss 4tis horis, vel sextis p.r.n.

Salol is very conveniently dispensed in 5-grain pills.

Belfield[106] gives a preliminary note on the value of iodine trichloride, and records four cases in which it was employed. Two of the cases were vesical tuberculosis, and two were those of tubercular epididymitis. All were considerably improved. The method of administration is by hypodermic injection, $\frac{1}{8}$ to $\frac{1}{4}$ per cent. in distilled water.

Saccharin was shown in 1887 to be of some value in chronic cystitis in reducing the amount of muco-pus in the urine.

Chronic Purulent Cystitis.—Boric acid ʒ ij, nitrate of potash ʒ ss; divide into eight powders. One to be taken daily in a pint of infusion of uva ursi—say a small teacupful every two hours.

Note on additional Remedies in Chronic Cystitis.—Creolin ($\frac{1}{2}$ per cent. solution) is recommended by Dr. Jefsner, of Stolp.[107]

Resorcin in gonorrhœal cystitis is recommended by Dr. Andeer. When the urine is either neutral or alkaline, from one to three injections are sufficient to cure acute diseases, and from a half-a-dozen the chronic form. Solution varies from 2 to 15 per cent.; two or three days intervene between each injection.

Boracic acid, gr. 10 bis die, 2 per cent. solution being used to wash out bladder; stigmata maidis, infusion of, gr. 8 to Oj boiling water, and wineglassful taken every two or three hours, or fl. ext. U.S.P. 3 j six hours; nitrate of silver, 2 per cent. solution in distilled water, gtt. 20 to 40 as injection, used in gonorrhœal cystitis; ichthyol, 2 to 5 per cent.

Iodoform bougies, gr. 5 in each, passed and dissolved in the bladder; borax; boracic acid: boroglyceride, as soothing and antiseptic injections; quinine; carbolic acid; and corrosive sublimate solution (1 in 10,000), are powerfully antiseptic; diluents and belladonna are most reliable internally; naphthaline, gr. 1 to 4 t.d.; collinsonia canadensis, tinct. ♏xx to 3 ij, for acute cystitis, combined with aconite and morphia; chimaphila, liq. ext. ♏1 to 10, tinct. ♏5 to 20; hydrastis, ext. liq. ♏5 to 30, tinct. ♏5 to 3 j.

Idiopathic Prevesical Cellulitis.—Dr. Englisch [108] draws certain conclusions from a *résumé* of thirty cases of idiopathic inflammation of the cavity of Retzius, seven being from his own experience. It occurs most frequently in males, from twenty-five to thirty years of age. There is an acute and a chronic form. In the former group the onset symptoms do not point to the prevesical space. Constipation, then diarrhœa and urgent gastric symptoms, then pain in the affected area is noticed. A tumour gradually appears between the second and twelfth day. The tumour suggests an over-distended bladder, but this is disproved by the catheter. Moreover, the swelling spreads from below upwards, it is sharply circumscribed, and is of a triangular form with the base uppermost. The inflammatory process may resolve or suppurate: apparently the former is most frequent. If suppuration ensues, the abscess may burst into the bladder, vagina, urethra, peritoneal cavity, or colon.

Occasionally the chronic form is met with, and the premonitory symptoms are absent, the appearance of the suprapubic tumour, with or without retention, drawing attention to the part. Probably scrofula or tuberculosis plays an important *rôle* in the causation.

TUBERCULOSIS OF BLADDER.

Both Reverdin,[109] of Geneva, and Guyon,[110] of Paris, have performed suprapubic cystotomy, and have scraped out the tuberculous deposits from the base of the bladder: both cases were successful. In Guyon's patient it was noticed that after the operation the bacillus tuberculosus was notably lessened in amount and finally ceased.

Pilcher[111] details four cases of tuberculosis of bladder treated by suprapubic cystotomy. Two were improved, two were not. The author doubts whether any amelioration results from topical treatment, attributing the improvement to drainage and rest of the bladder. He thinks the operation should be done whenever the cystitis does not readily yield to the well-known constitutional and local treatment, and that the drainage should be continued till the ulcers cicatrize, the urine becomes healthy, and the bladder normal in its action.

Mr. Battle[112] records a very important case of cure of a large tubercular ulcer of a woman's bladder after suprapubic cystotomy and thorough scraping, other methods having failed. The girl was aged twenty, with a family history of phthisis. The ulcer measured two inches by one and a half inch.

Koch's Method.—From experience of Koch's method of treating tuberculosis gained in the Berlin clinics—notably that of Prof. Bergmann, Mr. Fenwick[113] would advise a very small dose being administered—if this method be utilised—on account of the local swelling of the foci of disease. This swelling sometimes leads to the most distressing dysuria, and even to retention.

VESICO-VAGINAL FISTULA.

The late Mr. A. F. McGill,[114] of Leeds, recorded two cases in which a vesico-vaginal fistula was repaired

through a suprapubic wound in the bladder, as was first suggested by Prof. Trendelenberg. The first case was one of epithelioma, involving the floor of the urethra for its whole length, as well as part of the anterior vaginal wall and base of the bladder. The opening made in removing the growth was so large that, though he succeeded in bringing the edges of the hole which he had formed into apposition, the wound subsequently gaped, and a large vesico-vaginal fistula resulted. The chief interest in this case lies in the fact that in five weeks, without further treatment, owing to the efficient suprapubic drainage, the fistula entirely and spontaneously closed. The second case was an ordinary one following labour, in which the operation was perfectly satisfactory.

Ectopia Vesicæ.—The Trendelenberg operation (preliminary division of the sacro-iliac synchondroses to allow of the approximation of the pubes and edges of the *extroversion*) has been tried by Mr. G. Makins,[115] with only moderate success, and by Sir Wm. MacCormack.[116] The flap method has much to recommend it. In an elaborate treatise upon the subject, Pousson [117] reviews the history of the operation, and asserts that neither sex nor age have any effect upon the success of operative interference. All young children who are strong and vigorous ought to be operated upon as soon as possible. The method which he asserts is the best is autoplasty (by flaps). He inclines to Wood's classical operation.

RUPTURE OF THE BLADDER.

This accident, up to a few years ago, was regarded as lethal. Now in every year's record may be found successful cases of operative interference for both intraperitoneal and extraperitoneal rupture. Early diagnosis and early incision are the two factors for success.

All successful cases on record were operated upon within twenty-seven hours of the injury. The diagnosis is established upon the following data: History of a full bladder before and evidence of an empty bladder after receipt of the injury, the possible jerking passage of

the eye of the catheter into the peritoneum through the rent, and the sudden withdrawal of bloody fluid. The point of the catheter being felt with undue distinctness through the abdominal wall.

Cabot's method consisted in throwing a known quantity of fluid into a previously empty bladder. If this viscus is uninjured, the same quantity should be returned again through the catheter. To be of positive service such a test should, according to Weir,[117] be applied several times and with a decided amount of distension of the bladder. The author considers that this test may further be improved by combining rectal and vesical distension, with a known quantity of water for the latter viscus. The bladder outlined in this way above the pubes is only to be confounded with extravasation occasioned by the test, and this is controlled by the measurement of the fluid finally emptied from the bladder.

If dulness on percussion above the pubes occurs, and the fluid withdrawn from the bladder is lessened in quantity, an extraperitoneal rupture can be inferred. If no dulness or recognised vesical distension above the pubes takes place, but there is diminution of the injected fluid, intraperitoneal or subperitoneal postero-inferior rupture can be assumed.

If the latter exists, a rectal examination made before and subsequent to trying the test will show increase in the extravasation in that region, as was proved by the author in a case under his charge. Where the site of rupture cannot be determined with accuracy, suprapubic incision should be made, when any slight infiltration exterior to the bladder will be revealed. If this incision does not throw light on the case, the bladder should be opened sufficiently for digital and ocular inspection.

The occasional difficulty of diagnosis of ruptured bladder is well illustrated by the following case, reported by Mr. Hulke[118]: C. E., aged thirty-three, was butted sharply in the abdomen, and immediately felt great pain. He had passed urine two hours previously. The abdomen was resonant, and signs of shock were present, but he was unable to micturate. A catheter was passed with-

out difficulty, and six to eight ounces of urine slightly tinged with blood were drawn off. A small blood-clot was entangled in the eye of the catheter. Nine hours after, six ounces of similar urine were drawn off. Six hours after that, when Mr. Hulke first saw him, the shock had to a great extent passed off; but there was central dulness suggestive of full bladder, which disappeared on catheterization, twenty-two ounces being drawn off very slightly blood-tinged. No rent was found by the catheter, though searched for.

The next day pain increased, and the urine, which was drawn off was offensive: some vomiting.

The next day symptoms of well-marked peritonitis appeared, and a laparotomy was performed. A rent two-and-a-half inches long was found in the posterior wall of the bladder. It was sutured. The operation lasted two hours. Patient died eighteen hours after. Autopsy showed peritonitis, but the suture of the bladder was proved to be water-tight.

A remarkable case of rupture of the bladder due to ulceration in an old man of seventy-five is recorded by Dr. J. Johnston,[19] of Bolton. Twelve days before death, bright red liquid blood followed by clots suddenly preceded bloody micturition. The act was performed every two hours and with great straining. After these symptoms had lasted eleven days he felt a sudden and fearful pain across the bladder. He screamed, fainted, and had a rigor. After this no urine passed, and the catheter failed to withdraw any. On *post mortem*, a simple but deep ulceration three inches in diameter was found on the posterior wall. It had given way into the peritoneal cavity, and a pint of blood was found to have escaped through the rent.

STONE IN THE BLADDER.

It is needless to remark that since Otis demonstrated the dilatability of all parts of the male urethra, and Bigelow introduced crushing stone at a single sitting, that more calculi in the adult are removed by lithola-paxy than by means of lithotomy.

Stone in Childhood.—The most important question that can be now asked concerning stone in the bladder is: Are we able to avoid a cutting operation in male children as well as in the adult? Surgeon-Major Keegan[120] has ably solved this problem by recording a brilliant series of litholapaxies in male children. His success demonstrates that the chief advantages gained by using the lithotrite in male children instead of the knife are: (1,) No cutting is necessary; (2,) Greater rapidity of cure, in favourable cases the child getting up and out the next day; (3,) No after results are observed unless it be a testitis following a prolonged operation; (4,) The mortality is lower.

Large stones can be safely dealt with. Thus, Surgeon-Major Caldecott crushed a stone of 700 grs. in a boy aged nine and a half. Surgeon-Major Keegan[120] records a hundred and sixty litholapaxies in male children and boys with a mortality of seven (4·37 per cent.). Four if not five of these deaths were the result of extensive organic disease of the kidneys, and in only one out of the seven was the fatal issue directly connected with the operation. In the face of the information compiled in Surgeon-Major Keegan's table it is perfectly futile for those who have had no practical experience of litholapaxy in male children and boys, to maintain that this operation is only applicable to the treatment of calculi of small or medium size. Out of eighty-six male children and boys admitted into the Indore Hospital during the past three years suffering from stone in the bladder, seventy-nine were treated by litholapaxy by Surgeon-Major Keegan. He gives his opinion of the position of litholapaxy in the following words:—

"I have no hesitation in stating that it is the best surgical operation for the great majority of the calculi the surgeon meets with in male children and boys, once he has rendered himself thoroughly familiar with the use of the lithotrite. Should he aspire to performing this operation widely and successfully in male children and boys, he must provide himself with a large assortment of fully fenestrated lithotrites of small size, made

from the best steel which money can purchase, by thoroughly reliable workmen. His set of lithotrites—all fully fenestrated—should range from Nos. 4 or 5 at the bend of the blades to No. 10 at the end of the blades (English scale), and his evacuating catheters or cannulæ should all be fitted with serviceable stylets. But when I advocate litholapaxy as being the best operation, in my opinion, for the great majority of cases of stone occurring in male children and boys, I do so with a very important reservation, viz., that no one should attempt to perform it in boys until he has first gained some practical experience of it in adult males. The surgeon who meets with cases of stone only at rare intervals during his career, will be acting more wisely if he adheres to lateral lithotomy or suprapubic cystotomy. It is his misfortune, and not his fault, that he has not been afforded many opportunities of gaining a practical familiarity of the use of the lithotrite; but, on the other hand, he must not flatter himself that because he has performed a successful lateral lithotomy or a suprapubic cystotomy for a stone weighing thirty grains on a boy of ten years of age, into whose urethra a No. 8 lithotrite would have readily passed, that that boy has been especially lucky in coming under his care. For he may rest assured that the boy would have been luckier still had he been entrusted in the first instance to the care of one skilled in performing litholapaxy."

Surgeon-Major Freyer[121] says: "The dangers which we anticipated from the extension of litholapaxy to the case of male children were purely imaginary and had no foundation in fact, as is fully proved by my having now performed this operation in one hundred and fifteen males below the age of puberty without a death, and in all with complete success."

Surgeon-Major Gimlette[122] reports forty successful cases of litholapaxy in boys and male children.

The reports of litholapaxies in male children from other sources show that the opinion thus expressed is accepted on all hands as sound, and that the procedure is an important advance in the treatment of calculous

boys. Three hundred cases are now on record, with a total mortality of seven deaths (2·5 per cent.).

The difference which exisis between the results obtained by lateral lithotomy, lithotrity in many sittings, and litholapaxy in children may be gathered from the following table :—

OPERATION.	PERCENTAGE OF DEATHS.	CAUSES OF DEATHS.	COMPLICATIONS.	AVERAGE LENGTH OF TIME RECOVERING.	PAIN.	ADVANTAGES.	UNTOWARD AFTER-RESULTS.
Lateral Lithotomy	* 6·6 per cent.	Peritonitis 8 per cent. cystopyletis and nephritis 6 per cent. intercurrent	Perforation of urethra Rupture of urethra Hæmorrhage Wound of rectum, etc.	17·6 days Indore (Keegan) 18·9 days St. Peter's (London)	Variable	Complete removal	Incontinence (Teevan) Emasculation (Lagenbech)
Lithotrity	15·9 per cent.	..	..	One month ?	Great	..	Many attacks of cystitis, orchitis, retention etc.
Litholapaxy	·9 per cent. on 106 cases.	Nephritis	Nipping of bladder wall in one case	Next day well and up Discharged in 7 days (Keegan) 4·5 days (London)	Nil	Rapidity of Cure No cutting operation	Nil

* This does not include the results of Freyer, in India, who had a series of a hundred and forty-three cases of Lithotomy in children without a death.

Choice of operation for Calculus.—What special indications should govern a choice of operation as between lithotomy and litholapaxy?

Keyes,[123] of New York, makes such very pungent and valuable remarks upon the above question, that it is wise to reproduce them: "Facts are eternal and the premises from which conclusions must be drawn are not changed from

what they have always been, but our appreciation of the significance of facts varies. Old conclusions must now be modified by the light thrown from the three brilliant modern foci: (1,) The admirable results of litholapaxy as applied to male children; (2,) The undoubted triumphs of cystoscopy in perfecting diagnosis, more particularly as to the physical condition of the urinary tract; (3,) The accumulating confidence of those who are testing the value of suprapubic prostatectomy, as a radical measure for the relief of the enlarged prostate.

"These three considerations are the only ones I recognise as powerful in modifying our choice of operation, from what it would have been five, or even three years ago.

"This is the day of attempts at exact physical diagnosis. Time was, but is no longer, when a reputable surgeon may presume to advocate any one operation as applicable to all cases of stone. The same common sense and logical weighing of his patient's necessities must shape a decision in selecting the operation in this as in any and every other surgical field.

"To approach the subject then from its most material side, I ask, is the size of the stone now a prime factor in deciding the method by which its removal should be undertaken? At the present day and date the answer must be decidedly—No.

"Of course, small stones are easier to dispose of than large ones, by the lithotrite, and it seems natural that they should receive this method, larger ones being left to the knife. Yet this is so only in a negative sense, for a large stone, if large enough to be mechanically beyond the clasp or strength of the lithotrite, cannot be managed by this instrument; but aside from this the size of the stone is a matter of no significance at all.

"In a sort of negative sense even the paradox may be sustained, that the smaller the stone the less is it suited for the lithotrite in any but very expert hands. For one of the slurs cast upon lithotrity by its enemies is that it often leaves behind a last fragment to become the nucleus of a new stone.

"Yet if this last fragment, as is the fact, be so hard to find, even by a competent lithotritist, how much more difficult must be the finding of a very small stone than of a good sized one, by a surgeon inexpert in the use of the crushing instrument—for surely there can be no doubt as to the relative skill required to perform creditable lithotrity as compared with creditable lithotomy.

"I demonstrated this in a statistical paper, discussing the value of the then new operation, litholapaxy, many years ago, wherein it appeared that the percentage of mortality diminished rapidly as the number of operations by a given surgeon multiplied. At that date the death-rate was $2\frac{1}{2}$ per cent. for surgeons having performed five or more than five operations, while it was 18 per cent. for surgeons having performed less than five operations each.

"Any competent surgeon who can handle his knife well in general work can perform lithotomy perfectly, but he cannot perform lithotrity well until he has trained his hand by actual experience in a number of cases. For this reason alone lithotomy is, has been, and justly must always continue to be, the more popular operation with the general body of operating surgeons; but beyond this there are also other considerations, in modern days, throwing the balance in favour of lithotomy.

"For notwithstanding that the statistics of lithotrity—or litholapaxy, for this is modern lithotrity—are splendid in competent hands, and that in such hands if the stone can be crushed, it may generally be safely crushed; yet, even in such hands, the whole question ought to be, not—does the stone justify crushing? but does the physical condition of the patient and of his urinary tract justify lithotrity?

"And this view of the matter should, I think, obtain all through life. The age of the patient has nothing to do with it, and the stone nothing, except in lending itself mechanically to the possibility of lithotrity.

"The exceptionally brilliant results obtained in India, by Keegan and Freyer, with a wonderfully minute mortality, and repeated with less brilliancy in other

countries, show that the very young male infant, even with large calculus, is a most fitting subject for successful litholapaxy. If the stone in the infant or child be too large for such crushing instruments as will pass his urethra, it is also too large for proper extraction by the perineal route, and the suprapubic operation is called for; otherwise, litholapaxy should always be the operation of choice. For even the male bladder, before puberty, with its dependent orifice and no prostate, needs no surgical drainage. Take out the stone by crushing, and nature does the rest. I think it therefore safe to say, before puberty in either sex, *always crush when practicable; for large stones, cut above the symphysis.* It is far easier to crush successfully in the smooth bladder of the child than in any other. In middle life, some foreign bodies—glass, pins, pencils, etc.—naturally demand the knife, and the perineal route may be properly preferred, yielding as it does a less mortality than the suprapubic, and being often as suitable for the detection and safe removal of the offending body. But, aside from such adventitious nuclei, when the stone alone is considered, in the period between early adolescence and late middle age—say fifty—here assuredly, if the stone be very large, the high operation is suitable, while if it can be dealt with by the lithotrite it should be crushed and washed out, unless the physical condition of the parts contra-indicates this method.

"These physical contra-indications are few, being notably tight, deep urethral stricture, intense long standing cystitis, with altered mucous membrane (needing prolonged rest and drainage), sacculated stone, or concomitant vesical tumour. Of these conditions, two—urethral stricture and chronic cystitis—call for the perineal operation, the first median with liberating lateral vesical incision if required, the second lateral, the bladder neck being well cut into to insure prolonged free drainage; while the sacculated stone and concomitant vesical tumour naturally demand the suprapubic opening. Here it is that the cystoscope lends powerful aid in deciding what course shall be pursued.

"If the stone be too large for crushing, here as in the child, and for the same reason, the suprapubic route should be employed.

"Finally we come to the old man, and it is here, in my opinion, that modern experience instructs us to set aside or modify earlier conclusions.

"Formerly it was exactly in these cases that lithotrity (or litholapaxy) was most ardently advocated, for it was contended that, with the large prostate, there was no hope of having a healthy bladder, even after cutting, therefore why take the risk of the knife; and if the patient was in catheter-life why not employ the lithotrite, take away one of his sources of irritation, and let him keep on using his catheter?

"Now, while this argument holds its force still in the case of those old prostatics whose toughened urethræ make no protest against the frequent introduction of instruments, and who do not fret under this necessity for the mechanical performance of a natural function, yet there are a set of cases which I, at least, am learning each year to respect more and more—on account of an unhappy experience with some of them—cases in which the necessary mechanical disturbance attending litholapaxy so stirs up the vesical neck—whether every fragment be removed or not—that cystitis more or less intense and prolonged follows the operation, and both the patient and surgeon come to regret that the more radical cutting operation had not been decided upon at first.

"To this class belong: (1,) Prostatic cases that have not used a catheter at all, or have not become habituated to the instrument; (2,) Most of the pallid, flabby, fat subjects who show early the corneal arcus, and especially, it seems to me, (3,) Those who exhibit a tendency to recurring localized eczema (not only of the extremities), and to flatulent dyspepsia.

"These cases, if properly selected, do very well under lithotomy, and in them the suprapubic method should be adopted, because it allows the surgeon to deal, at a single sitting, not only with the minor necessity—the small stone—but also with the more important and permanent

disability—the enlarged prostate, by prolonging the suprapubic lithotomy into a prostatectomy—and making the patent's necessity become the surgeon's opportunity."

Pulverization of Stone. — Surgeon Major Forbes Keith[124] recommends the complete pulverization of the stone at a single sitting, and the *débris* to be evacuated without the aspirator. This step forward had already been taken by Guyon[125] of Paris, and was being mooted before the important communication of Dr. Keith appeared. The pith of the improvement is to make use of the muscular contraction of the bladder wall to expel the fragments of the crushed stone (*cp. Technique, p.* 114).

Perineal lithotrity.—Mr. Reginald Harrison[126] points out that one great advantage which lithotomy possesses over lithotrity, is that it permits the operator to satisfy himself by the use of the finger that every fragment of stone has been withdrawn. With the view of securing this advantage in combination with those which modern litholapaxy possesses, Mr. Harrison advocates the employment of perineal lithotrity in some cases, as presenting the means (1,) for the digital exploration of the bladder and the associated parts, both before and after the removal of the stone; (2,) the rapid evacuation of the stone, and (3,) the drainage and irrigation of the bladder, should this prove necessary. The operation consists in the simple expedient of opening the membranous urethra in the median line, so as to permit the introduction into the bladder of a pair of specially made crushing forceps, by which the stone is broken and evacuated. The latter consist of a strong pair of rather narrow bladed bladder forceps, with a cutting rib down the centre. They are sufficiently strong enough to break any stone which can be fairly grasped; they are, in fact, constructed on the same principle as the blades of a lithotrite, and are intended for use in the same manner.*

In a case related by Mr. Harrison[127] in support of this expedient, a calculus was removed in a few minutes which could not have been safely accomplished under

* They are made by Messrs. Krohne & Sesemann, of London.

half an hour by the ordinary lithotrite and water evacuation.

"Apology is hardly needed," says Mr. Harrison, "for bringing under notice an operation which may, in some cases, be revived with considerable advantage. Circumstances are now very different to what they were twenty-five years ago, when perineal lithotrity had numerous advocates. Thompson had not then taught us the great value of digital exploration in diseases of the bladder; Otis had not demonstrated the full capacity of all parts of the male urethra to dilatation; Bigelow had not shown us the tolerance of the bladder to prolonged but gentle manipulations; nor had we learnt the value of drainage and irrigation of the bladder, and how much operative surgery was capable of doing for the enlarged prostate when this was found to complicate stone." In the presence of these advances Mr. Harrison submits, that perineal litholapaxy will be found of considerable service, and that its more general employment will tend to reduce the number of stone recurrences after litholapaxy as usually practised.

Lithotomy. — Mr. Reginald Harrison [128] advocates lithotomy and drainage in those cases where the stone is the *effect* rather than the *cause* of the diseased bladder. By means of this operation, not only is the stone removed, but the bladder, which resembles a chronic abscess, is effectually drained. He gives fifteen cases thus treated, twelve of which did well. When may the drainage tube be removed? When the urine becomes normal, and as soon as the bladder can expel its contents independently of the tube. With but few exceptions, calculi are to be crushed. If too large for that operation they ought to be removed by perineal lithotrity (*q.v.*), or suprapubically.

ENCYSTED STONES.

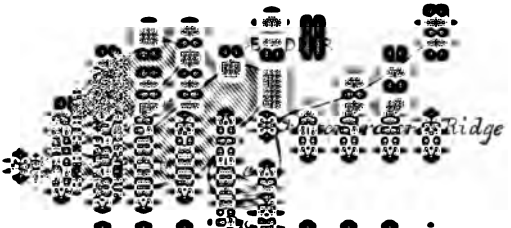
It was pointed out by Mr. Rivington [129] that the chisel is a valuable agent for cutting up encysted stones. A case is reported by Mr. Hurry Fenwick,[130] in which he was able to cut up an encysted calculus $4\frac{1}{2}$ oz.

in weight, by means of a chisel and mallet passed through the orifice of the diverticulum after suprapubic cystotomy had been performed. The case was successful. Mr. Buckstone Browne[131] records an encysted stone of small size removed by the suprapubic incision.

Trigonal or Post-Prostatic Pouch Stones. — Mr Buckston Browne[132] draws especial attention to the importance of searching post-prostatic (trigonal) pouches in cases of obscure bladder disease. He considers that the trigonal pouch is "the chief cause of error in searching for stone and of imperfection in its removal, whether by the lithotrite or the knife." The trigonal pouch is often of extraordinary depth. If the patient is supposed to be lying down, it may be said to consist of the trigone of the bladder pushed down between the enlarged and projecting prostate in front, and a thickened and firm inter-ureteral ridge behind. Where there is much intra-vesical prostatic projection, the pouch may literally be roofed over by this prostatic outgrowth. Calculi in this pouch cause much pain, since the trigone of the bladder has a much larger nervous supply than any other portion. Lying as the pouch does in front of and below the orifices of ureters, it is a perfectly contrived trap for the catching and retention of renal calculi upon their entrance into the bladder, and it will readily be seen how favourably the stones are there placed for growth. Owing to the post-prostatic pouch, vesical calculus is often difficult to detect in cases of enlarged prostate, and that, if the pouch be deep it may be absolutely impossible to find the stone by any instrument passed in through the urethra. Owing also to the occasional depth of the post-prostatic pouch, lithotrity is sometimes an impracticable operation, since it is mechanically impossible to evacuate the bladder of all *débris* by urethral instrumentation.

The following case is a good example. It was one of an uric acid calculus weighing fifty grains, shown in *Fig.* 4, which Mr. Buckston Browne entirely failed to find by sounding, in the bladder of a gentleman aged eighty, although he examined him thoroughly three times, once when he was anæsthetised, using lithotrity tubes and

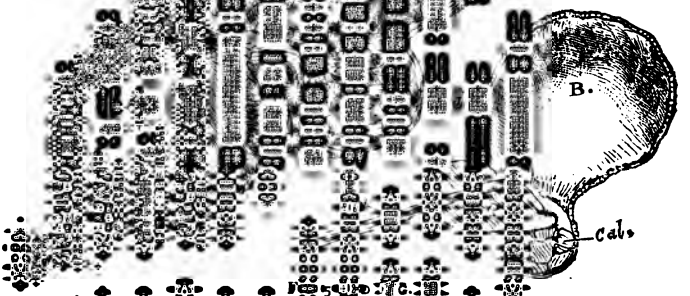
ves. His
ot shaken,
uprapubic
adder with
y, owing to



lay. The
by the op-
of what is
s may exist
the reach
hra.
luable and
ompanying
convey to
impeding

ese cases,
broad flat
nd it slips
ary round-

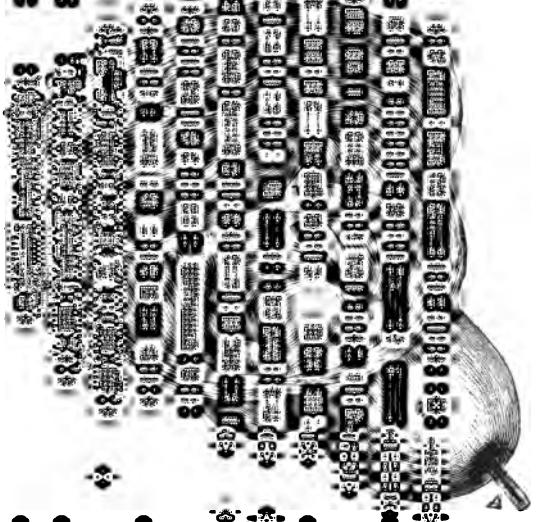
the prostate,
xplored as is
the natural



thra. *B.* Bladder
te calculi in post-
The prostate.
e a lithotrite (*S*)

of five cases
kston Browne
certain cases
prostate, for
behind and
lar that the
t reach them
orcibly it was
over, harmful
vre upon the
e were apt to
prostate was

verse, or if
nula should



trigonal pouch.
prostate. *R.R.*

sed bladder,
t pilot, and
fully prodded
presence of
n are conse-

he bladder
nula could
ight electric
introduced
or examined
rocedure in
suspicion of
he ordinary

cystoscope could not be used. If a stone or benign growth was discovered, a director could be passed

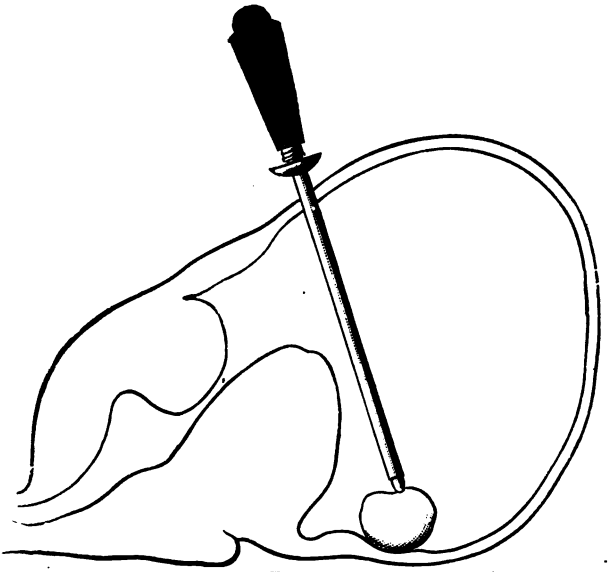


FIG. 8.

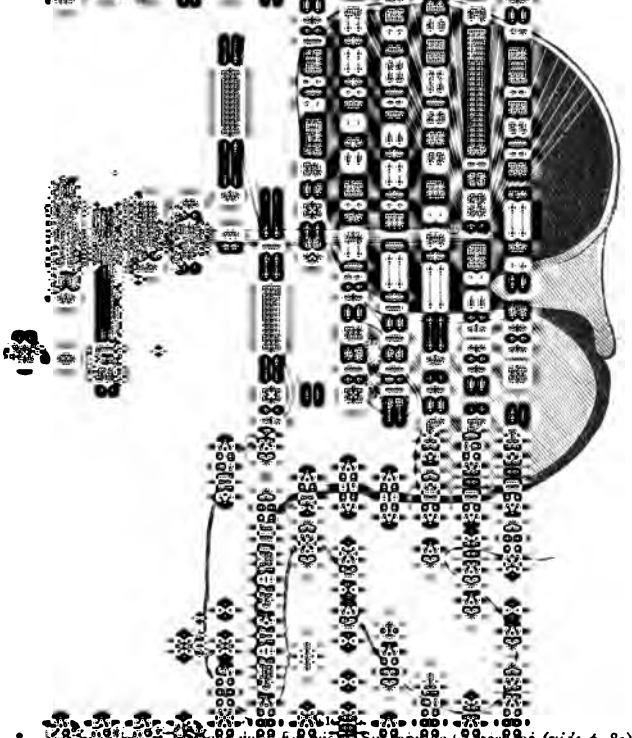
Fenwick's Method of Sounding Bladder with Suprapubic Trocar.

through the cannula, the latter withdrawn over the director, and the bladder opened by a limited incision on the director. The disease could then be dealt with, and the bladder drained. He submitted that this method of sounding and cystoscoping would save exploratory suprapubic cystotomy, which was a severe procedure in old age, and one which should not be undertaken lightly.

RESULTS OF OPERATIONS FOR CALCULUS.

In an analysis of nine hundred and sixty-four cases of operation for stone, Sir H. Thompson[134] stated: (1,) That stone in the bladder was not more common in children

due to the
d practice.



(*vide p.* 81).

lass of the
hose whose
n kind and
e following

ly.

Total.

... 849

(2,) His experience had confirmed the value of the principle, which he had long ago insisted upon, of finding the calculus at the earliest date possible for the elderly adult male, in whom it so frequently occurred. Two cogent reasons existed for this: first, the stone when small was easily removed, and very little risk attended the operation; secondly, at this stage of calculus production the re-formation of an acid calculus (uric or oxalic) could almost invariably be prevented by strict dietetic precautions. As regards the choice of operation, Sir H. Thompson said that in the case of children he had employed lithotrity for stones of moderate size, but very large ones, which some perhaps might crush, he would prefer to cut; he liked the suprapubic operation for boys, for the wound could be closed at once, but in adults he preferred a free opening, allowing drainage for some days afterwards. So also in the adult, crushing might be carried to stones of four ounces, if one chose, provided a large evacuating tube could be passed. In connection with this, he observed that the adult male of sixty-five to seventy-five possessed as a urethra a very insensitive and capacious channel, whilst the most irritable urethræ he had found in men of from twenty-five to forty, and any over-distension of these frequently gave rise to trouble. If an evacuating tube as large as No. 18 could be passed, a three-ounce uric-acid stone when crushed could be removed with great facility. If he found an irritable passage with a rigid prostate, admitting only a No. 13 or 14, he preferred to employ the suprapubic operation for a large calculus. His experience with children was small, but in them lithotomy had given good results.

One hundred and thirty-nine cases of lithotomy are recorded by Dr. Assendelft.[135] In thirty-five cases out of thirty-eight lateral lithotomies, he has observed hæmorrhage following the operation. He quotes one hundred and two suprapubic lithotomies with two deaths, and these in children under five years; ninety-eight patients recovered. Of the two remaining cases one is yet suffering from a fistula, and the other is afflicted with pyelitis. Hæmorrhage was considerably less than in the lateral

lithotomies. In no case was the peritoneum wounded. The bladder was sutured in all cases where the urine was normal. Of seventy-four suture cases twenty healed *per primam;* in seventeen the edges separated near the drainage tube; in thirty-three they separated fully. All the patients were under thirty years; sixty of them being under ten years.

DISEASES COMPLICATING STONE IN THE BLADDER.

Stone in the bladder in connection with Splenic Disease.—This subject has been mooted by Mr. C. Williams,[136] of Norwich, who records the case of a man aged thirty-two, with an enlarged amyloid spleen (4½ lbs.), who manufactured an uratic stone 1½ ounces in weight in two years; data for this supposition are given. It is pointed out that as patients with enlarged spleen, especially those suffering from anæmia, pass a large quantity of uric acid in their urine (Senator), the cause for the formation of this stone lay in the splenic disease. It is also shown that major or minor operations are contra-indicated in splenic leuchæmia, because of the great tendency which this disease exhibits to the production of hæmorrhage, gangrene, or embolism (Fayrer).

FAILURES IN SOUNDING FOR STONE.

Mr. Hurry Fenwick[137] gives certain reasons for the occasional failure to detect calculi in the bladder by means of the sound. Chief among these reasons was the disposition of the folds of swollen and succulent mucous membrane, which can be seen by the cystoscope to partially envelop small stones in those cases in which chronic cystitis is present. Cases of sacculated stones discovered by the electric light are recorded, and the following rules are formulated: (1,) Never sound during "an attack of the stone"; (2,) Reduce inflammatory swelling previous to sounding by a few days' rest in bed, and appropriate medicine; (3,) Sound in every position

of the body (even in complete inversion in children) and with every degree of distension and contraction of the bladder. If renal colic has recently occurred, perform suction; (4,) Fully distend the bladder in order to examine the basal pouches; (5,) When the symptoms of stone are obvious, and suction, sound, and lithotrite have failed, use the cystoscope as a last resource.

INSULAR DISTRIBUTION OF CALCULOUS DISEASE.

The distribution of calculous disease in the British Isles is, according to Dr. Isambard Owen's[138] collective investigations, along the Eastern coast of England and Scotland. Its chief seat in South Britain is the county of Norfolk, whence it radiates into the neighbouring counties. In North Britain the part which it most affects is the angle of land above Aberdeen, from which it extends down the east coast to the Forth.

TUMOURS OF THE BLADDER.

(*Editorial by Mr. Hurry Fenwick.*[139])

The operative treatment of tumours of the bladder is an advance of this decade. The names of Sir Henry Thompson and Guyon are inseparable from the subject; whilst the labours of Southam, Barling, Albarran, Kummell, Wallace, Watson, and Willey Meyer have added greatly to the knowledge acquired and published by the pioneers I have mentioned first. To fulfil the object of this epitome, however, it has been thought well to re-cast the subject in the form of an editorial without references to the numerous and often conflicting articles which have appeared in every European language upon the subject.

As was predicted in 1888, the introduction of electric cystoscopy inaugurated a new era in the diagnosis and treatment of obscure diseases of the urinary organs. The extent of the progress which has been made by means of this method can now be gauged in nearly every department of urinary surgery. It is perhaps, however,

Fig. A.

Fig. B.

most marked in the present state of our knowledge of those tumours which affect the mucous membrane of the bladder, and in the more effective and judicious treatment which is now adopted in dealing with them. Early recognition of their presence, a just appreciation of malignancy, and an early and free ablation of the benign types have, in the last six years, superseded the halting diagnosis, the uncertain digital exploration, and the unsurgical and generally incomplete removal of all forms of vesical tumour, irrespective of their character or their rate of progress. The experience of more than a hundred cases of tumours of the bladder enables me to emphasize these statements, and at the same time to touch upon certain points which seem to me to have an important and practical bearing upon the judicious and successful treatment of the disorder.

The vesical tumours which occur in childhood may be dismissed with short notice. They are very rare, usually of a sarcomatous nature, and commonly prove so rapid and luxuriant in their growth that they are beyond the domain of surgery almost before the true character of the case is recognised. *Fig. A, Plate I.*, is a photograph of the bladder of a girl aged five (Guy's Museum, 2104[30]). The neoplastic mass which is represented as hanging below the level of the vertically opened bladder had protruded during life from the urethra. It had been forced along that channel by the enormous pressure of the exuberant sarcomatous growth which had previously over-distended the viscus. This luxuriance proves rapidly fatal by obstruction. The overgrowth is often the cause of some operative difficulty when these tumours are attacked. Thus, in boys, the sarcoma is sometimes so compressed in the bladder that it literally springs from the viscus as the suprapubic incision divides the wall, and its return is impossible. The surgeon is then committed to the complete removal of the mucous membrane, or to a resection of the protruding mass; in the latter case an open fungating wound is left.

Our interest in the vesical tumours in the adult centres round their radical removal. This depends upon the

three factors which constitute the lethal capacity of any given tumour: (1,) The character of the base, whether it is prone to infiltrate the wall of the bladder; (2,)* The location of the tumour over or near the urinary outlets (ureters, urethra); (3,) The capacity of each variety to exhaust by hæmorrhage.

(1,) *The Character of the Base.*—Although papillomata are innocent tumours, and for many years evince no tendency to infiltrate the subjacent tissues, yet, as time advances, a papilloma may undergo carcinomatous degeneration towards its base and rapidly take on malignant action. This is a strong argument for their early ablation. The sarcomata usually infiltrate rapidly, for they originate in the submucous tissues, and part or all of the bladder is soon transformed into a thick hard

* *Which is the variety most frequently met with?*—Sir H. Thompson has said that "villous growth (papilloma) is in fact of all varieties that which most commonly affects the bladder." This, Mr. Fenwick submits, is not supported by the statistics of the removal of vesical tumours, which show a very large percentage of recurrences; nor is it warranted by the number of "cures" effected. Out of twenty-nine cases Sir Henry Thompson recorded five complete cures. Again, Guyon has reported twenty-two cases of vesical growths upon which he has operated, and only three of these were benign. Mr. Fenwick's list for this last year comprises thirty cases of vesical growths, and only two of these were benign. Moreover, in preparation of the Jacksonian Prize Essay he examined the various museums of Europe, and found one hundred and fifty to two hundred cases of carcinomatous vesical growths without difficulty, but only about fifty specimens of undoubted papillomatous growth.

Mr. Roger Williams, on making an analysis of thirteen thousand eight hundred and twenty-four primary neoplasms of all kinds consecutively under treatment at the Middlesex, University College, St. Thomas' and St. Bartholomew's Hospitals, during the last sixteen to twenty years, found that in ninety cases (0·65 per cent.) it originated in the bladder. They were distributed as follows:—

Kind of Neoplasm.	Total.	Males.	Females.
Cancer	59	43	16
Sarcoma	6	5	1
Fibroma	2	1	1
Papilloma (Villous)	23	21	2
	90	70	20

Fig. C.

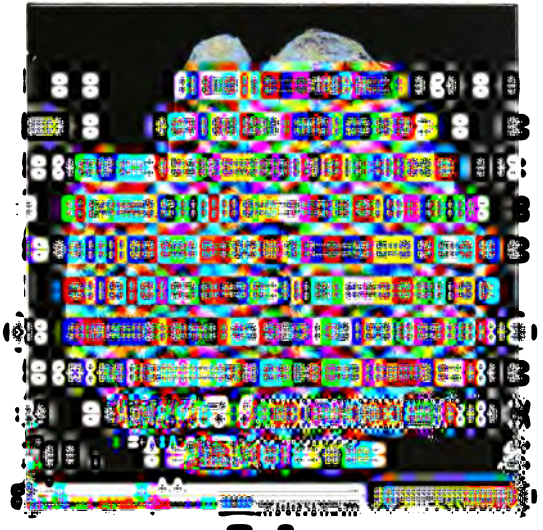
Fig. D.

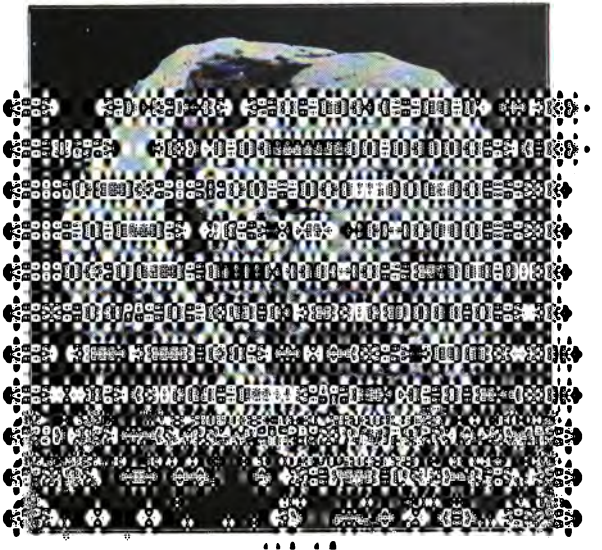
cake. *Fig. C, Plate II.* (R.C.S. Mus., 3,706) represents a vertical section of a bladder entirely transformed into lympho-sarcoma, only a crack being left of the vesical cavity. Occasionally (10 per cent. of sarcomata) a sarcomatous growth is encountered in which a definite tumour has formed, and this is so pedicled to the surface as to permit of its complete removal. *Fig. B, Plate I.* (Guy's, 2103-50) represents a pedicled sarcoma. Carcinomata differ widely as to their basal character. Two well-pronounced types exist, between which, however, there are many intermediate grades. A knowledge of this is of the utmost importance in giving an opinion as to the advisability of dealing with malignant tumours. We are able to recognise a succulent form of epithelioma of the mucous membrane which may be very torpid at first. It often develops slowly. The activity and increase are mostly towards the surface. It moreover infiltrates indolently; so that, if attacked early, it may be freely removed, and with a fair chance of increased tenure of life. *Fig. E, Plate III.* (University College Museum, 1475) shows a large succulent malignant mass which springs from a well-defined base from the posterior wall. The bladder is divided vertically and opened out like a book. On the other hand there is the dense, rapidly infiltrating form of malignant disease which causes an early thickening in the wall, very easily distinguishable by rectal examination. This hardness is coincident, or is felt very soon after the onset of the symptoms. On opening such a bladder a large ulcer, excavated and rolled like a rodent ulcer of the skin, is sometimes seen (*Fig. D, Plate II.*), but more generally it is met with as a tuberous sessile growth possessing a shreddy or papillary surface. Its chief mass is situated exactly over that portion of the base where the cake-like hardness is detected per rectum. *Fig. F, Plate III.*, represents such a sessile mass, and the wall beneath it towards the left base is seen to be extremely thick and infiltrated. In this form the operator is powerless, and any interference with the surface aggravates the disease. All that can be done is appropriate drainage. I cannot furnish statistics

as yet to show how often the slower growing, succulent, surface epithelioma will be met with, for up to quite lately such cases were only sent to me when they were already well advanced in the infiltrating stage, but I believe they occur in a fair proportion, and that in the future such will be attacked in their earlier stages, and a certain amount of benefit will accrue from the intervention.

(2,) *The Position of the Base of Vesical Tumours.*—The papillomata show a marked tendency to grow about the orifices of the ureters (69 per cent.), or to grow around or float into and to cork the urethral orifice (8 per cent.). In the *ureteral* position they drag upon and narrow these openings, or they may similarly obstruct the free outflow of urine from these orifices by covering them completely. An insidious, chronic interstitial nephritis of one side is thus produced by the backward pressure, and this progresses unnoticed by the patient or the practitioner. When the urethral orifice is narrowed or obstructed by a floating pedicled papilloma, the bladder becomes hypertrophied, and finally both kidneys become hydronephrotic. When such growths are at length submitted to operation the patient passes through a dangerous crisis, and may finally succumb to kidney failure. This untoward termination can be avoided by earlier operative interference, for it is not the suprapubic removal which creates the mortality in simple growths—it is the postponement of ablation until one or both kidneys have become irreparably damaged by backward pressure. These remarks apply with still greater force to sarcomata and carcinomata, for these forms not only affect the neighbourhood of the ureters, but frequently invade the orifice of the bladder as well. Renal changes, therefore, which a benign growth may require years to produce, will only need months when the growth is of malignant type. Super-added to this is the danger of ascending inflammatory mischief which is so readily induced by injudicious examination in all forms of vesical tumour, and which appears early and spontaneously in the rapidly disintegrating malignant tumours.

PLATE III.





(3,) *The Tendency to exhausting Hæmorrhage.*—It is rare for a pure papilloma to bleed otherwise than moderately in the beginning of its life. As its age advances in *years*, however, the tendency to hæmorrhage becomes more marked, the intervals of freedom shorter, the control of drugs less certain, and the loss more profound. When carcinomatous changes have taken place in the base, the capacity for profuseness is heightened. If the tumour is malignant, the onset hæmorrhage may be alarmingly severe. This is more especially the case when the hæmorrhage has been started by a blow or wrench, which has split the soft surface of the growth or has lacerated its basal attachment. The initial attacks of hæmorrhage from any tumour (cp. Symptoms) are so transient and so readily checked by medicine, and the patient is generally so averse to examination of the bladder, that valuable time is lost, and the surgeon is only consulted when the depletion can no longer be controlled by drugs. The damage has probably, however, been done. If it be a papilloma, the profuse drain upon the system affords the ablation a diminished chance. Several times I have been reluctantly forced to adopt the perineal route in patients, blanched by repeated and exhausting hæmorrhage, in order to save life, but I have operated thus with the full knowledge that the removal would be incomplete and unsurgical. A perineal operation is tantamount to a recurrence, and yet this is preferable to losing the patient debilitated by loss of blood, from the exhaustion of the suprapubic method.

In cases of pedicled sarcoma or carcinoma, a prolonged or a debilitating hæmorrhage, coupled with that feeble healing power which patients even in the early stages of malignant growths often exhibit, renders an ablation or a resection much more hazardous.

CLINICAL HISTORY (Symptoms).—I think I may assert that each of the three groups—the papillomata, the indolent surface epitheliomata, and the dense and rapidly infiltrating carcinoma—possesses a well-marked clinical history; but before describing these I wish to remark upon "onset" symptoms.

The "onset" symptom, or group of symptoms, which first attracts attention to the urinary organs, does not herald the *birth* of the growth. The onset symptom really marks the termination of the first stage of the existence of the tumour. In nearly every case of tumour which I have cystoscoped within a few weeks of the commencement of the symptoms, I have found the growth to possess a surface characteristic of the type to which it belongs, and to be of a size above that of a monkey nut.* From this it can be safely inferred that the growth has been in existence for some time, and, judging from the slow growth of certain papillomata, often for a long time. Again, in examining some cases by the cystoscope on the recurrence of the symptoms after operation, I have found that the hæmorrhage only appears when the tumour has reached a decided size. Tumours have, moreover, been met with by chance in the *post-mortem* or dissecting rooms, and it has been ascertained that they had given rise to no symptoms during life, the patient having succumbed to some other disease before the first stage of the tumour had been passed through.

First Stage.

(The Latent Period.)

There is, therefore, in the life history of every tumour a variable period in which no symptoms are complained of. This first stage may be conveniently termed the "*latent*" period.

Second Stage.

The latent period is brought to an abrupt termination either by the appearance of blood in the urine, or by the sudden development of irritability of the bladder and pain on micturition. Most writers, copying Gross, have laid stress upon the character of

*I have met with two exceptions, both of which were examined within two months of the initial hæmaturia; one was the size of a pea, the other the size of a split pea.

these onset symptoms as being indicative of the nature of the growth, and have asserted that the appearance of hæmaturia points to a benign character, but that the occurrence of vesical irritability reveals a malignant type. We now know this to be a mistake, for the softer forms of epithelioma bleed some months before they commence to infiltrate and to induce irritability and pain.

I possess accurate facts which permit me to assert that 92 per cent. of benign growth and a large proportion of softer surfaced malignant growth mark their transition from their latent first period to the second period of their existence by the appearance of blood in the urine. The importance of this statement cannot be over-estimated when we remember that it is only in these two classes of tumour that operative procedure is indicated and advisable. The third and infiltrating group, which starts with cystitis is quite inoperative.

Onset Symptoms of Benign and of Succulent Surface Epitheliomata.—The onset hæmorrhage from a benign growth differs sometimes from that caused by a succulent epithelioma of the mucous membrane. In the former the loss is generally slight, consisting most often of a few drops of blood at the end of a clear micturition, or of a single evacuation of rosy coloured urine. Its advent is nearly always causeless. In epitheliomata, however, the patient often attributes the onset to a strain, to jolting in a conveyance, or to over-fatigue. The onset hæmorrhage is, in the latter disease, not infrequently more profuse. Both hæmaturias, however, share this characteristic, that they are at first *painless and unaccompanied by vesical irritability*, unless, of course, there is retention or blockage from clot. The hæmorrhage is intermittent in both groups, but in the benign the intervals of perfect health and normal urine are longer than in the epitheliomata in the proportion of years to months. Should a papilloma become pedicled, or should it tend by its position to obstruct the free outflow of urine, other symptoms will be super-added to the hæmaturia, such as obstruction to the stream, straining, and pain at the end of the penis. It is usually rare for this to occur

within the first two years. The other symptoms of the second stage relate to obstruction to the stream, frequency of micturition, and pain. Sooner or later both forms of growths will enter upon their third stage—namely, that in which cystitis appears as a complication.

Onset Symptoms of Dense, Infiltrating, Malignant Disease.—Usually the first symptom is the occurrence of great irritability of the bladder. Pain on passing water is felt towards or at the glans penis. The urine becomes rapidly puriform, and blood appears in variable amounts. In many cases the three symptoms are practically coincident.

Third Stage.

This period is ushered in by the appearance of cystitis. In benign tumours the third stage may be delayed for fifteen or for twenty or more years; but once cystitis has set in, renal complications are apt to supervene, and the operation for removal has but an indifferent chance of success. With the surface epithelioma the advent of the third stage is, of course, much more rapid. The growth begins to break down and infiltrate usually within nine months of the onset of painless hæmaturia, and then all hope of successful removal is gone.

In dense, rapidly infiltrating carcinoma the second and third stages are most often merged together, the onset symptoms being sudden pain, frequency of micturition, and hæmaturia. In some the hæmaturia may precede, by a few days, the pain and frequency of micturition; in others the symptoms of cystitis may precede the hæmorrhage, but practically the broad rule obtains that the second and third stages are passed through simultaneously.

Diagnosis.—*Benign Growths.*—Intermittent attacks of hæmaturia unaccompanied by urinary pain, frequency of micturition, or obstruction to the stream, occurring in a patient about or over thirty years of age, who has intervals of perfect health and *normal* urine, should be regarded as most suspicious indications of vesical growth.

An examination of the urine usually affords a clue to the vesical origin of the hæmorrhage: vesical characters being the formation and passage of large irregular-shaped clots, of brightish blood-coloured urine, and of the appearance of blood at the completion of clear urination. Although any one of these characters may be absent at any one particular time in the second stage, yet they may be met with in the course of it, and inquiries should be made concerning them. Moreover, in a small percentage of the cases (19 per cent.) scraps of growth are passed, and these are certain evidences of the vesical position of the tumour, *though not of the true character of the base of the growth.*

It is well to remember that "villous" scraps are quite unreliable as guides to the benign character of the tumour, for 41 per cent. of vesical carcinoma have a surface covering of villous processes; and *pure villous* tufts co-exist in one-sixth of the sarcomata and in one-fourth of the epitheliomata.

Succulent Surface Growths.—I know of no certain guide arising out of the onset symptoms which would serve to mark the *character* of the growth, occurring after the age of forty-five. The electric cystoscope or the finger can only decide as to whether a papilloma or a succulent surface epithelioma is present. It is this failure in our clinical knowledge which causes me to urge an electric cystoscopy, directly an intermittent, painless hæmaturia appears after the age of forty.

Infiltrating Carcinomata.—These are recognised by their onset symptoms, the detection of the hardness per rectum, and the exclusion of enlarged prostate and stone.

Diseases Simulating Benign Tumours,—There are four groups of diseases of the urinary tract which evoke symptoms similar to those produced by benign growth in the bladder, and although the electric cystoscope in an educated hand will render the diagnosis certain in the majority of cases yet the instrument is not always available. It is therefore advisable to enumerate them :—

(1,) Prostatic congestions in young men from excessive masturbation or sexual intercourse produce an intermittent symptomless hæmaturia.

(2,) Certain renal hæmorrhages, such as are produced by chronic contracting granular kidney (West, Bowlby), or by latent carcinoma of the kidney, need careful elimination by microscopical examination for casts and renal palpation, for they also induce a symptomless hæmaturia.

(3,) Urethral caruncle in the female often simulates a vesical papilloma.

(4,) In men over fifty a small uric acid calculus in an insensitive bladder, or lodged behind a prostate, produces a similar symptomless hæmaturia.

PROGNOSIS.—Presuming that the case is one of vesical growth, what circumstances should incline us to take a favourable view of the character of the tumour? Undoubtedly the length of time which the symptoms have lasted without inducing cystitis. If the bleeding has lasted for more than five years and the patient has not reached middle life, there is every prospect of the tumour proving a pure papilloma.

On the other hand, when the patient has passed forty-five, when the onset hæmorrhage has resulted from some slight violence, when it is copious to begin with or rapidly becomes violent and resists the action of hæmostatics, there is a grave fear that the tumour is a succulent epithelioma of the mucous membrane. I must confess I am still further inclined to view its character with suspicion, when I learn that there is a family history of longevity, or that the patient has passed through some severe mental strain, or some exhausting illness such as epidemic influenza prior to the commencement of the symptoms. A strong history of carcinoma in the family, or in the patient, may be present either with the benign or with the malignant growth. It should not bias us. I have removed growth from a bladder of one lady who had had two operations for carcinoma of the breast, and the tumour I ablated was a typical instance of pure fibro-papilloma. This was four years ago, and she is still free.

INJUDICIOUS TREATMENT.—Now, it cannot be too strongly enforced that the benign tumour and the succulent epithelioma before it has commenced to infiltrate, are both removable by operation, provided only that they are attacked in the favourable period of their existence. The former can be ablated with a fair chance of permanent cure, and the latter with a fair hope of an increased length of life. In both cases the operative removal can be carried out without danger, without mutilation, and without any fear that a fistulous and leaking wound will be left behind. But this promising result depends absolutely upon the manner in which the tumour has been treated by the medical man prior to the operation. If cystitis has been induced—and it often is by the injudicious zeal of the surgeon in repeatedly sounding for stone, or by washing out the bladder to check a hæmorrhage—that is to say, if the third stage of the existence of the growth has been artificially hastened, the patient's chance of a sound and speedy recovery after operation is greatly lessened, nay, more, his chances of a speedy recurrence are greatly increased.

It is worth while considering then, how cystitis influences the result of such an operation. When cystitis complicates a benign tumour, slight one-sided pyelitis is often also induced; for, as I have mentioned above, these growths are mostly situated over or around the ureteral orifice, and they obstruct and dilate the ureteral canal, which becomes readily inflamed by contiguity. Moreover, the wound left by the operation on an *inflamed* bladder, heals slowly and sluggishly, and the hæmorrhage may continue for days after it should have ceased. The increased vascularity of the mucous membrane around the site of the growth fosters any tendency to recurrence which the tumour may possess. The suprapubic or perineal wound obstinately refuses to close. When cystitis has appeared in a bladder affected with succulent epithelioma, the pabulum of blood brought to the tumour, and therefore the rate of progress of the growth, is increased tenfold. The inflammatory wave attaches the movable and previously

healthy base of the tumour to the muscular wall, and the latter becomes rapidly infiltrated. The operation wound probably will never heal, but will become more or less quickly implicated. It therefore behoves us in dealing with a case of symptomless intermittent hæmaturia to be very chary in the use of the catheter or sound. If it is considered necessary to employ the latter, let it be manipulated with the utmost care. No attempt should be made to separate or scrape off a piece of growth for examination, for in nearly every case the most gentle sounding will increase the hæmorrhage, and such roughness as this will change a controllable bleeding into a profuse and persistent loss, besides inducing cystitis. As regards washing out the bladder in order to arrest an alarming hæmorrhage or to remove a solid mass of blood clot which is causing retention, the instruments must be aseptic and the water employed *sterile*. Septicity introduced brings disaster on the patient and discredit on the practitioner.

TREATMENT.—This must be considered under two divisions: (*a*,) Palliative; (*b*,) Operative.

(*a*,) *Palliative Treatment.*—This will be mainly directed towards arresting the hæmaturia in the second stage, and in the third stage to relieving the pain and irritability of the bladder by means of sedatives. In the earlier attacks of bleeding, any hæmostatic will usually suffice —gallic acid, or ergot, or alum, or iron, combined in every case with opium, will suffice. When the hæmorrhage has once become established, it is often most rebellious. In some cases it is so furious that nothing short of cystotomy and removal of the growth if it be benign, or of the surface of the growth if it is too far advanced for ablation, arrests it. It is, however, a grave question how far it is wise to arrest or check a profuse loss in a patient who has evident cancer of the bladder. The hæmorrhage often relieves pain, and the drain upon the strength curtails months of terrible suffering. As regards the alleviation of the pain and irritability of the confirmed bladder cancer, I regret that I can say but little. Two courses are open, either the exhibition of morphia, locally

or hypodermically, gradually increased, or a cystotomy and permanent drainage to relieve the incessant and agonizing spasm, which the presence of urine and the muscular irritation of the invading growth evokes. Even this latter in advanced stages is frequently futile.

(*b*,) *Operative Interference.*—The advice I submit, which should be tendered to a patient concerning operative interference, should be controlled mainly by the presence or absence of cystitis, and by the condition of the wall of the bladder as felt through the rectum or vagina. Should any dense infiltrated patch be felt in the vesical muscle wall, operative interference for the ablation of the growth will be perfectly useless. If no infiltration can be felt and no cystitis is present, suprapubic ablation should be recommended. A patient from whom a benign growth has been removed by means of suprapubic cystotomy within a year or two of the onset of symptoms, may be assured of a rapid and usually of a complete recovery. The presence of cystitis adds the danger of prevesical cellulitis and delays the healing of the wound. If the base of the tumour, as felt through the suprapubic wound, be at all hard, a year of freedom from profuse hæmorrhage may be promised, though usually a slight and transient show of blood takes place after the end of six months.

The following case is an excellent example of what may be done in succulent epithelioma, even when the strength is exhausted by bleeding and the growth is of large size. The patient aged fifty-four, was brought to the London Hospital by my late dresser, Mr. C. A. Harrison. He was breathless from bronchitis and emphysema, debilitated and blanched by profuse and long-continued hæmorrhage. I removed a growth from the right side of the base of the bladder through a suprapubic incision. It was so voluminous as to fill a 6-ounce graduated glass. Within a week the drainage tube was removed, and in three weeks he was presented at a clinical lecture with the wound dry and almost healed. All the water was passing naturally.

I invariably recommend a suprapubic cystotomy in the male, if the patient shows "vis" enough to warrant the

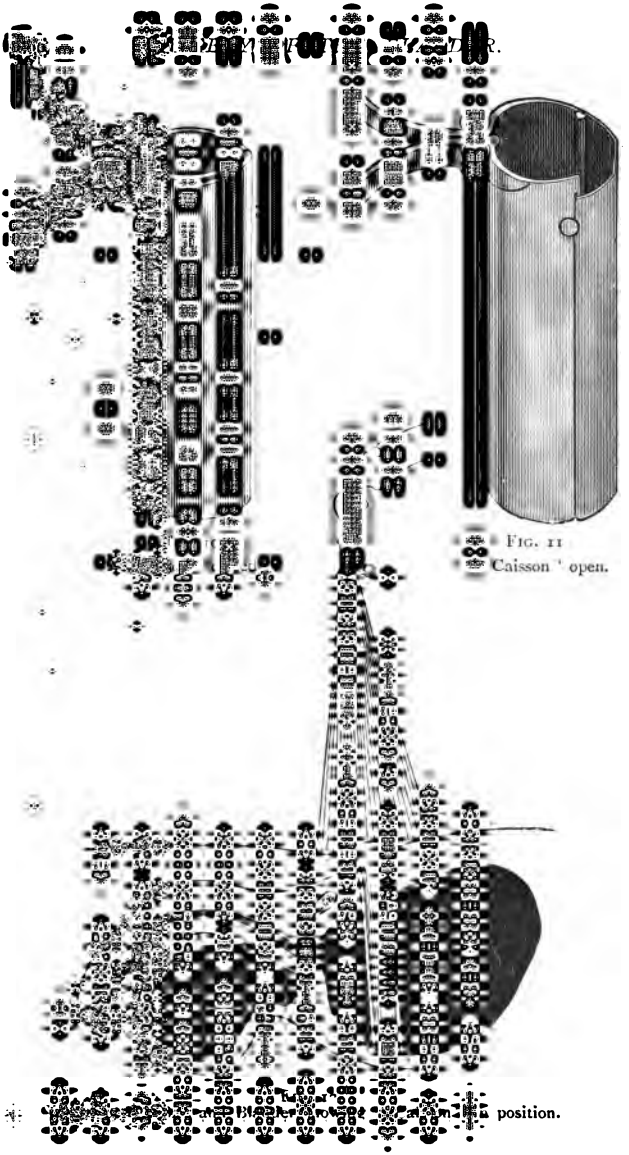


FIG. 11
Caisson ' open.

[illegible] position.

procedure. I have never removed a growth *thoroughly* through the perineal wound, unless it chanced to be pedicled and within easy reach of the finger.

The suprapubic operation is a very simple undertaking (*vide* Technique, p. 106). I do not use either the Trendelenburg position or a rectal bag, for neither are ever necessary, unless pericystitis has been suffered from. A two-inch suprapubic median incision starting from the pubes is made, the recti are separated, and the bladder, which has been previously distended, is hooked up, and a one-inch vertical incision is made into the viscus. Two blunt button hooks are then inserted, and the assistant holds the ends of the wound taut by these, while the operator slips a "caisson"*[140] (*Fig.* 10, *Fig.* 11) into the bladder and directs it towards the place where the growth has previously been seen, by means of the cystoscope, to be placed. The open end of the caisson is rested on the growth (*Fig.* 12), and the water is sucked out. A head lamp or mirror throws light upon the tumour, which is then twisted off or torn away piecemeal by means of long catch forceps (*Fig.* 13, *Fig.* 14, *Fig.* 15). When all the surface of the growth has been removed the base is attacked. It is either snipped out by means of scissors, or cut away with a lance-pointed knife, or a circular knife. The hæmorrhage is checked by firm pressure of a sponge dipped in a solution of iron, and double drain tubes are inserted. The caisson is withdrawn over them, the bladder is washed out through the tubes, and the patient removed to bed. In three days' time the tubes are removed, and in a week the patient is on the

*A "caisson" in engineering work is a chamber of iron or wood which is used in the construction of subaqueous foundations, such as those required for the piers of bridges. Caissons, often in the form of enormous hollow cylinders, are sunk over the sites selected for the position of the piers, until they rest upon the river bed, and sink into the softish soil by their own weight, or by ballast pressure. The upper end is above the river level. The water is pumped out until the cylinder is empty, and the excavation is then proceeded with as if on dry land.[140]

Expanding caissons may be obtained from Krohne and Sesemann, Duke Street, London, or different lengthed or sized Ferguson's specula may be employed.

15.

couch. I only remember one case, viz., of carcinoma, in which the wound has not closed before the end of the third week.

The caisson method in my hand has proved of especial value in the very earliest stages of benign tumours, *where the growth was very small;* also in removing small sessile, secondary splashes of villous growth which are so often left behind untouched or unrecognized by the finger after the main piece of the tumour had been wrenched or scraped off.

It is to be recommended upon the following grounds: (1,) A small incision is quite sufficient; (2,) The continual passage of fingers, forceps, curettes, and sponges through the wound and bladder incision is rendered unnecessary, for the caisson once introduced is not removed until the stitches have to be inserted. All bruising and tearing of the bladder incision by these manipulations are thus avoided, and if cystitis is present, all chance of fouling the pre-vesical connective tissue is minimised; (3,) The growth, the whole growth, and nothing but the growth, is thoroughly removed; (4,) The smallest patches of primary or secondary growth can be seen and accurately treated, the caisson being shifted from place to place; (5,) The base of the growth can be cauterized by means of a galvano-cautery porcelain point with safety and certainty; (6,) Bleeding can easily be arrested before the patient leaves the table.

But I do not always use the caisson. Sometimes I drag the growth to the opening in the bladder and dissect it off the wall. In women, after careful dilatation of the urethra, I employ the same manœuvre. I seize the growth with the long narrow forceps, bring it to the opening of the urethra, and dissect it off the muscle wall, or twist it off its base. An operator should never forget that a slovenly removal means an early recurrence, whether the tumour be benign or malignant.

Author's Results.—I have operated forty* times with a definite object of removing tumours which I had diagnosed

* I have, since writing this, operated fifty times with four deaths.

by means of the electric cystoscope as being present, and as being benign enough to repay attack. My first case proved a mistaken diagnosis, for the tumour was merely a small papillomatous-like tag coexisting with tuberculous disease. In another, a female case, I deemed it best to leave the tumour alone, but, probably with my increased experience and better methods of removal, I should not again hesitate to dissect a similar growth away. It proved to be a very dense epitheliomatous ulcer. On thirty-eight occasions I have removed tumours. The perineal operation was performed four times, because the growth was near the urethral orifice; the female urethra was dilated in nine instances, and the suprapubic route was chosen twenty-five times. I regret to have to chronicle three deaths as the direct result of the operation. The patients were males, and two were the subject of a small but pure villous papilloma. The operation was easy in both cases, but both cases died of suppression. Unknown to me, both had had epidemic influenza three or four days before I operated. The third case was dying of hæmorrhage and advanced renal disease when I interfered.

Nature of the Tumours.—The microscopy of growth removed by operation is so unsatisfactory that I should not like to say how many of the cases were purely benign; probably twenty-five seemed to be benign.

Recurrences.—Two carcinomata recurred three months after a very thorough removal, but then cystitis was present in each when I operated. Both are dead. Four other cases have recurred and have been operated upon. All the cases, with the exception of the five cases I have mentioned, are living and in good bladder health. It is, however, too early to speak about "cure," for five years have not elapsed in any case, though one has already passed the fourth year in perfect health.

I attribute much of my success to a careful selection of favourable cases by means of the cystoscope, and here I would remark how very fully the character of that instrument has been vindicated by these results.

Not only have I only once cut into a bladder (my first

case) to remove a tumour which did not exist, but I have been enabled to select, out of a hundred cases of vesical growth, those cases which repaid operative interference. Moreover, out of some hundreds of cases of obscure urinary disease, it has enabled me to select at least fifty cases of vesical growth the existence of which I should have been unable to pronounce upon with certainty without digital exploration. Much needless instrumentation and operation have thereby been avoided.

I may mention that I am much influenced, among other cystoscopic appearances and conditions, by the colour of the tumour. If the tumour surface be translucent and of a pinkish hue and it exhibits no signs of necrosis, I know that I am dealing at least with a growth in a favourable stage. The smoother the tumour the more I am inclined to suspect its deeper origin, for surface epitheliomata have a great tendency to produce a true villous covering. If the tumour is white or greyish white, I invariably diagnose malignancy. It is also extremely suspicious of carcinoma to see a powdering of white phosphate of lime upon a tumour which has only lately declared itself.

I submit from my own experience that I am justified in asserting that the removal of a growth of the favourable type from the bladder is a simple and safe operation. That danger, if danger exists, lies in attacking carcinomata in their advanced stage, or in ablating tumours of a benign type which have been long enough in existence to cause serious renal changes from backward pressure or which have been suffered to enter the period of cystitis either by neglect or by mal-treatment.

STATISTICS OF OPERATIONS FOR VESICAL TUMOURS.

Sir Henry Thompson gives forty-one cases: twenty six recovered, fifteen died at periods varying between three days and four months, two cancer, two papilloma, eleven myomata.

Mr. Hurry Fenwick gives fifty ablations: four of

these died from the result of the operation and the rest recovered good bladder power.

Professor Guyon,[141] as quoted by Albarran, records fifty operations and seventeen deaths. Albarran,[142] quoting from the literature, clearly supports Mr. Fenwick's contention that benign or semi-benign growths only should be selected for interference. Thus the records show that forty-eight cases of benign growths were operated upon, with three deaths. Ninety-seven cancers were operated upon, with forty-three deaths.

TECHNIQUE OF THE MORE MODERN OPERATIONS ON THE BLADDER.

Suprapubic Cystotomy. — The scales of professional judgment of this operation have nearly recovered from the oscillations given to them by the Braune-Garson-Petersen's[143] method of elevating the prevesical peritoneal fold. The inexpediency of suprapubic cystotomy *entirely* supplanting the perineal route has been accepted. Its security as compared with the old procedure has been established. Most reserve it now for large stones, or vesical growths which are multiple or inaccessible from the perineum, or for drainage in certain cases.

Certain questions of extreme practical importance, as to the technique of this operation, are still awaiting matured consideration.

Is the preparatory distension of the rectum a necessity?— Some surgeons lay but little stress upon the value of rectal inflation in order to raise the prevesical fold of the peritoneum. "The manœuvre facilitates the operation, but is not a necessity to the experienced operator" says Trendelenburg,[144] after performing suprapubic cystotomy on forty-two cases. Mr. Fenwick[145] with an experience of seventy cases does not employ the procedure.

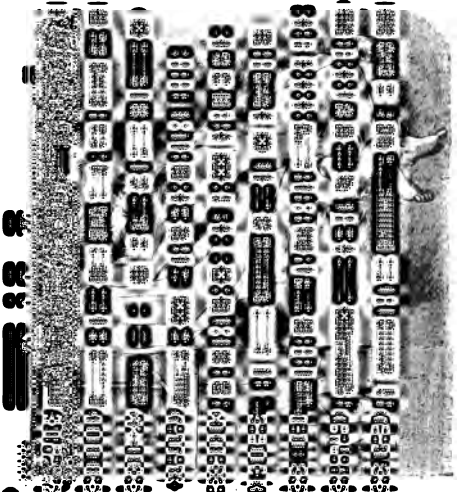
All agree, however, that the distension must not be carried to extremes. Dangerous hæmorrhage and even

fatal results have been recorded. Thus, MM. Nicaise,[146] Cadge and Pontier[147] report deaths from rupture of the rectum, and M. Anger stated that five deaths have already been reported to the Societé de Chirurgie. Fatal rupture of rectum by a Petersen bag distended with 8-oz. occurred in G. R. Fowler's[148] practice, the bag passing through the rectal split, and appearing suprapubically inside the peritoneum. The operator, therefore, in attempting to escape the Scylla of the peritoneum, must avoid falling into the Charybdis of a ruptured rectum.

Vesical Injection v. Vesical Inflation. — Bristowe[149] (Brooklyn) has made a number of experiments to determine the relative efficiency of air and water. He states he has found that with air the bladder is lifted up easier and more thoroughly than with water. He proposes to use inflation in suprapubic cystotomy, and to employ expired air, as it is said to be sterile. If it is desirable to measure the amount of air injected, a syringe can be used for the purposes of inflation. In order to sterilize the air it will be sufficient to interpose between the syringe and the injecting nozzle a glass tube filled with a filter of sterilized cotton. He adds, the danger of infection, however, is somewhat fanciful, as the bladder which requires suprapubic cystotomy is sure to contain pyogenic organisms.

What is the best position for the patient to be in during the operation?—A glance at *Fig.* 16 will show the "Trendelenburg position,"[150] which is not sufficiently known or appreciated in England. This position is preferred by many surgeons (Küster, Keyes, Lange, Gerster, and others). It is held by Meyer to be preferable to illumination of the inside of the bladder with an electric surgical light while the patient is flat on his back. The electric light ought to be used rather in the Trendelenburg posture when the trigonum Lieutaudii, usually the most interesting spot within the bladder, is not covered with blood and urine, but, being the highest point in the bladder, may be sponged and kept dry. To be entirely satisfied with the posture, it should be kept in mind that the pelvis is to be

that respect.
levation helps



Chir., xxxi., 3)

al fold at the
[illegible] only advises
[illegible] titis has been
[illegible] disease of the

[illegible]on better than
[illegible]er method of
[illegible]ünther thirty-
[illegible]by Trendelen-
grounds: (1,)
[illegible]n be avoided
[illegible]y the median
[illegible] the bladder is
[illegible]d from either
[illegible]lly useful in
[illegible] recti muscles

and fasciæ are divided transversely as close as possible to the pubes, and while the left hand lifts away the peritoneal fold, the right carrying the knife works closely to the superior and posterior surface of the pubes. The bladder is opened transversely. The transverse route is certainly much easier, and it affords much greater space for manipulation; but the mutilation is infinitely greater, the shock in elderly people more profound, and the main vertical abdominal muscle and the vesical detrusor is severed to the detriment of the muscular power of the belly and bladder, and the patient is exposed to the contingency of ventral hernia. In the majority of cases it is unnecessary to have such free incision or inspection. If, however, in the course of an operation sufficient room cannot be obtained by the ordinary longitudinal incision, the edge of one or both recti can be nicked transversely and sufficiently, without placing the entire muscles *hors de combat.* The value of the transverse or cross incision is thus summed up by the late Mr. McGill:[152] "It is true that with the longitudinal incision the view obtained of the interior of the bladder is not quite so good, and that manipulation in its interior is not so easy as with the transverse. On the other hand, my experience of eleven cases of transverse suprapubic cystotomy has shown me that healing is, as a rule, much slower with a transverse than with a longitudinal incision. In cases where a suprapubic urinal must be worn, the transverse incision is certainly inadmissible. The recti, if undivided, form a sort of sphincter and grip the tube introduced into the bladder, thus preventing the escape of urine by its side. If these muscles are divided urine will escape by the side of the tube, thus making the urinal comparatively useless. These remarks apply not only to cases of vesico-vaginal fistula, but to all cases of suprapubic cystotomy."

Separation of the Symphysis.—Wickhoff[153] dilates upon the need of room in suprapubic cystotomy for vesical tumours, and suggests symphyseo-cystotomy. This operation has already been performed by Albarran, but it is not to be commended.

Suprapubic Cystotomy in two stages.—N. Senn [155] proposes in cases of septic cystitis to perform the operation in two stages, as necrosis and phlegmonous inflammation of the margins of the wound and the tissues in the prevesical space not infrequently take place if the operation is performed for affections complicated by septic cystitis. In the first operation the bladder is freely exposed in the usual manner, and the prevesical fat is dissected away over a vertical oval space at a point corresponding to the location of the proposed vesical incision. After this the wound is packed with iodoform gauze. The incision into the bladder is postponed until the external wound has become covered with active granulations. This usually requires four to six days. This modification is asserted to diminish the immediate risks of the operation and to afford protection against a number of serious complications.

Resection of the Bladder.—Albarran [154] exhibited a patient, part of whose bladder he had resected for recurrent epithelioma. Symphyseotomy was performed as well as the usual suprapubic incision; the inferior left lateral part of the bladder was removed without difficulty, and the result was successful.

Mr. Fenwick[156] has successfully resected part of the left lateral wall in a man for recurrent epithelioma, and found that access to the bladder was sufficiently obtained by dividing the left rectus and lower abdominal oblique muscles. Probably in most cases this incision will be sufficient, and symphyseotomy can be reserved for very large resections, or for those growths which need ablation of part of the prostate or bladder base as well.

Control of Hæmorrhage.—Dr. Weir,[157] of New York, in recording a case of suprapubic lithotomy and prostatectomy relates that smart oozing followed the snipping off of the prostate median lobe. It was partly relieved by taking out the rectal distending bag, often a cause of the continued bleeding, but it was only completely controlled after the finger had felt the internal urethral orifice to be free from any further protuberances, by packing the bladder firmly with iodoform gauze in such a way that

the pressure of the ordinary dressings should be carried backward and downward to the prostate through the mass purposely left in the bladder. Dr. Weir has resorted to this expedient of a direct compress in vesical hæmorrhage after suprapubic cystotomy with removal of a neoplasm in three instances with a satisfactory result. In twenty-four hours the gauze is usually withdrawn, having not only checked the hæmorrhage, but kept the bladder comparatively aseptic and free from odour.—Cp. "Technique of Prostatic Operations."

What is the best after-treatment? Shall we suture or drain?

Suture.—The success of the suture depends apparently upon: (1,) age. In children under fifteen,* the suture is very successful; (2,) In bladders with comparatively healthy urine and mucous membrane, the suture is to be recommended, but much depends upon the surgeon himself, the accuracy and technique of the suture. With some surgeons suture appears to be very successful. Thus, Van Itersen quotes ten primary unions out of twelve sutured bladders, Lange seven out of eight. Assendeft records twenty successes in seventy-five trials.

Meyer lays down the following rules: (1,) If there is no catarrh of the bladder, or only a slight one, the wound of the bladder ought to be closed by primary and eventually the abdominal wound by secondary suture; (2,) If the catarrh of the bladder is serious and combined with septic suppurative pyelitis, the bladder ought to be drained; (3,) In less serious cases both methods may be combined with advantage, *i.e.*, the greatest part of the wound of the bladder may be sewn up, and only a small spot in the middle left open for passing the tube.

Drainage.—Farrar Cobb[158] suggests the use of capillary drainage for the bladder after suprapubic cystotomy. An ordinary glass drainage tube rounded at the lower end, and with a collar at the top, is passed into the bladder. Along the whole length of this is pushed one end of a long strip of iodoform gauze, the other and outer

* Lequen of Paris asserts 88·33 per cent. of cases of suture of child's bladder heal by first intention.

end is led over the side of the bed into a bottle, and capillary drainage is thus established; the strip of gauze is changed once in twenty-four hours. The wound is packed with absorbent cotton wool, thoroughly impregnated with oxide of zinc ointment. After dressing the wound, which is done every twelve hours, it is advisable to draw off any urine which may be present in the bladder by means of a syringe.

The secret of successful drainage is in its *freedom*—whether it be carried out by the open method (without tubes), or with a T tube, or double tubes, or wick, or suction.

Drainage after suprapubic cystotomy by inserting ureteral catheters is advised by Willems[159] whenever the urine is unhealthy and septic, because the urine is thereby conducted straight from the ureters into a receptacle without contaminating the wound, and because it also permits of the bladder being plugged with antiseptic material.

Continuous Suprapubic Drainage inducing Mental Symptoms.—Dr. John A. Wyeth[160] has raised the question whether continuous suprapubic drainage does not induce mental aberration. The three cases which he quotes occurred in old and feeble men long after the traumatic effects of the operation had subsided. Those who took part in the debate were rather of an opinion that iodoform used in the operation, and subsequently, had some share in the mental derangement. Mr. Fenwick submits there is reason to believe that vesico-prostatic ailments in the old aggravate any inherited tendency to suicide or mental aberration.

STATISTICS OF MODERN SUPRAPUBIC CYSTOTOMY.

	CASES.	DEATHS.
Hunter McGuire[161]	26	1
Bassini[162]	21	1
Trendelenberg[144]	38	7
Van der Veer[164]	7	1
Buckston Browne[165]	13	4
Mayo Robson[166]	18	0
Dittel	22	5
Southam[167]	17	5
Hurry Fenwick[168]	50	8

LITHOLAPAXY IN CHILDREN.

Contra-indications to Litholapaxy in Children.—Presupposing that the surgeon is used to lithotrity in the adult, and has a light and dexterous hand, these contra-indications are only three in number: (1), A very small calibred urethra not admitting even a No. 5 English lithotrite; (2,) A very hard, or very large stone, or one with a nucleus of a foreign body; (3,) A contracted and diseased bladder.

Certain golden rules may be laid down for litholapaxy in children:—

(1,) Examine carefully, per rectum, to ascertain size of the stone and condition of bladder.

(2,) Let your decision, as regards the advisability of litholapaxy, be made subject to the size of the urethra and the hardness of the stone—estimating both while the patient is under chloroform.

(3,) Never *force* the lithotrite through the meatus. Incise the latter (Keegan).[120]

(4,) Select invariably a *completely fenestrated* lithotrite (Keegan) *Ibid.*

(5,) Use the lightest of hands, work towards the posterior wall, and let your crushing be thorough.

(6,) Remember that during the operation each successive passage of instruments, whether lithotrite or evacuating catheter, is attended with increasing difficulty, presumably from the swelling and congestion of the parts.

(7,) Remove *all* through an evacuator catheter carrying a stylet, using the latter to rid the eye of any sharp particle which may cut or lacerate the delicate urethra during the removal of the instrument (Keegan) *Ibid.*

LITHOLAPAXY IN THE FEMALE.

This is more difficult, according to Prof. Guyon[169] than is generally supposed. This is partly due to the bladder being roomy, and to the absence of a prostate which would limit the *bas fond.* The beak of the instrument

should be thrust against and depress the posterior wall, so as to create a sort of artificial base. Care must be taken in the female to avoid nipping the loose folds of mucous membrane of the flaccid bladder.

ON THE EVACUATION OF DÉBRIS AFTER LITHOTRITY.

Mr. Harrison[170] writes: "Prof. Guyon's practice, as I have frequently observed it, is as follows: The patient being fully anæsthetised, the fenestrated lithotrite is introduced and the stone not merely broken up but absolutely pulverised. In the last case I saw, a urate phosphate stone with a diameter which only just brought it within grasp of the largest lithotrite, was subjected to a process of trituration that lasted for twenty-five minutes by my watch, without, I believe, a single withdrawal of the instrument. When no fragments could be felt with the lithotrite the evacuating catheter was introduced. The latter consisted of a full-sized instrument with a large eye on either side of the beak. No aspirator was attached to it, but after the bladder had been allowed to empty itself spontaneously of its contents by the catheter, an ordinary syringe was attached to the latter and about six ounces of warm boracic solution were gently injected. Then the syringe was disconnected and the bladder allowed to empty itself, this process being continued until the contents of the syringe were returned absolutely pure. The bladder was finally washed out with a solution of nitrate of silver (1 in 1000) and a rubber catheter was passed and retained for drainage purposes for twenty-four hours. The operation was completed in forty minutes, and considerably over an ounce of stone powder was withdrawn suspended in boracic lotion. This latter had the appearance and feel of soft homogeneous mud. There were no appreciable fragments of stone in it.

The following were the noticeable points:—

(1,) The use of the lithotrite to produce this effect was necessarily more prolonged than where mere fragment-

ation is the object—a point of no importance so long as the lithotrite is carefully used under an anæsthetic.

(2,) The less frequent introduction of lithotrites and evacuating catheters along the urethra—a point of some importance where the prostate is large and the deep urethra irregular.

(3,) The back action of the suction apparatus, by means of which fragments of stone often become impacted in the saccules and lacuna found in bladders, complicated with enlarged and irregular prostates, is done away with.

It will be noted that others besides Guyon advocate thorough trituration. Surgeon Major Forbes Keith[171] gives the technique of an operation which he suggests as follows: After the administration of chloroform, the first step is to thoroughly wash out the rectum with Condy. The bladder itself must also be thoroughly irrigated if the urine is in any way tainted, as it frequently is in the aged, after which it will be found more tolerant of the auxiliary fluid. When a sufficient quantity of the latter has been introduced, the point of the lithotrite on its first introduction is met by the index finger of the left hand immediately on a plane behind the sphincter ani, and is then guided by the finger through the prostate and into the bladder. The stone is broken up in the first instance by the largest instrument admissible; a size smaller is preferred to finish the operation. The stone is then crushed to fine sand. Some stones break up into finely divided mud or sand, which, mixing with the fluid in the bladder, wells up between the lithotrite and the walls of the urethra. It has various colours according to the quality of the stone, appearing sometimes almost milky white, and passing through various shades, such as from meerschaum and fawn to brick-red. The welling up of these colours always warns the surgeon not to go on working with the largest lithotrite the urethra can admit, but to change it for one of much smaller size, otherwise he will find great difficulty in removing it, owing to the instrument having lost its glossy smoothness, and become coated by a bluish-black film, and the

urethral mucous membrane itself will be found to have lost its oily smoothness and become coated with finely divided mud.

An evacuating catheter is finally introduced, and the bladder allowed to empty itself. Water is then thrown in by means of a syringe or a special irrigating can, and this again is ejected by the bladder.

On the repetition of this process for a few times the *débris* of most stones is rapidly evacuated. In children, where the *débris* must be reduced to finely divided powder or mud before it can get through the eyes of such small catheters or cannulæ, evacuation of the *débris* can be effected by merely letting the water fall out of the syringe into the mouth of the evacuating catheter without in any way connecting them, and the reflex action of the bladder thus excited will at once cause the evacuation of the *débris*.

Since receiving new instruments from home (in February, 1891), Dr. Keith has had a series of one hundred operations without a death, and one hundred and fifty-seven with three deaths.

ACCIDENTS DURING LITHOLAPAXY.

Impaction.—Dr. Bolton Bangs [172] states that accidents during litholapaxy are not uncommon, but that they are usually confined to the bladder itself or to the breaking of the instrument. In the following case he records, however, the accident was due to the stone. After the first crushing and evacuation of a stone, it was found that the lithotrite could not be passed through the prostatic urethra, though persevering efforts lasting over half-an-hour were made.

Suprapubic cystotomy was then performed, and it was seen that a fragment of stone had become lodged between the enlarged median lobe and the posterior wall of the bladder, causing the former to be pressed forwards and to create an insuperable obstruction.

Extravasation.—Dr. Keyes[173] reports a case of urinary extravasation after litholapaxy, which is most instructive.

The patient was sixty, with moderate prostatic obstructive disease. He had had two litholapaxies performed previously, and declined taking chloroform. He struggled violently under ether. After the operation suppression set in, which was relieved by the administration of 20 grs. of calomel. Neither chill nor temperature ensued. Ten days after, another attack of suppression supervened, the belly began to swell and a deep thickening could be felt on one side. An exploratory incision over the posterior part of the swelling disclosed a cavity containing a quart of urine. The cavity surrounded the kidney, and contained masses of putrid lymph. The effusion was subperitoneal. With appropriate drainage the patient was reported to be practically out of danger at the meeting before which the case was brought. Dr. Keyes thought the effusion came from a cyst either of the kidney or upper part of the ureter, which ruptured during his violent struggles while taking ether, and that the other kidney stopped acting temporarily from sympathy.

Rupture of the Bladder.—Mr. Edmund Owen [174] reported a fatal case of rupture of a boy's bladder during the evacuation of the fragments of a stone. The boy was about five years old, and after the operation was practically finished a final washing was performed. During this an ominous gurgling was heard, and an unmistakable wave ascended behind the anterior abdominal wall. All resistance, moreover, to the flow from the evacuator ceased; and on detaching the wash-bottle, only a trifling amount of water escaped by the tube. There was no doubt that the bladder had given way, and that the best chance of the boy's recovery probably lay in opening the abdomen and sewing up the rent. A three-inch incision was made in the linea alba above the pubes. The peritoneum was opened and a search was made for the collapsed bladder in the depths of the pelvis, nothing being seen of the bladder until the peritoneum had been traversed. The rent, however, was eventually discovered in front of the peritoneum, and at the root of the urachus. It was also made out

that the irrigation-fluid which had escaped from the bladder had infiltrated itself along the subperitoneal connective tissue, none of it having entered the peritoneal cavity. The rent in the bladder—which was about one-eighth of an inch long—was sutured, and the abdominal wound was closed. It was deemed expedient to secure absolute rest for the bladder by a perineal drain. The boy died of collapse in eight hours. Mr. Owen attributed the calamity to the large size of the wash-bottle used.

ELECTRIC CYSTOSCOPY.

The method of illuminating the interior of the bladder, which was conceived and carried out by Dr. Nitze,[175] of Berlin, in 1879, was greatly simplified in 1887 by the substitution of an incandescent lamp in the place of the platinum loop. The electric cystoscope was thereupon changed at once from a "costly, complicated, and cumbersome instrument, into one practical, simple, and safe." The incandescent lamp had already been used for diagnostic purposes in the female bladder, by Dr. Newman,[176] of Glasgow, and by Mr. Mayo Robson,[177] but it was not until 1887 that it was adapted to the male cystoscope.

An electric cystoscope (*Fig.* 18), has the shape of a short beaked calculus sound of 22 guage (French). Three parts of it demand explanation.

The Beak.—The entire beak is a hollow hood (*Fig.* 17, *G*), which can be screwed on and off the shaft of the instrument (*Fig.* 17, *Le*). It has a long, oval aperture, *C F*, covered in with a thin pane of rock crystal. The hood, *G*, when screwed on, protects the small incan-

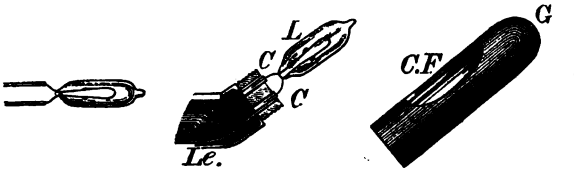
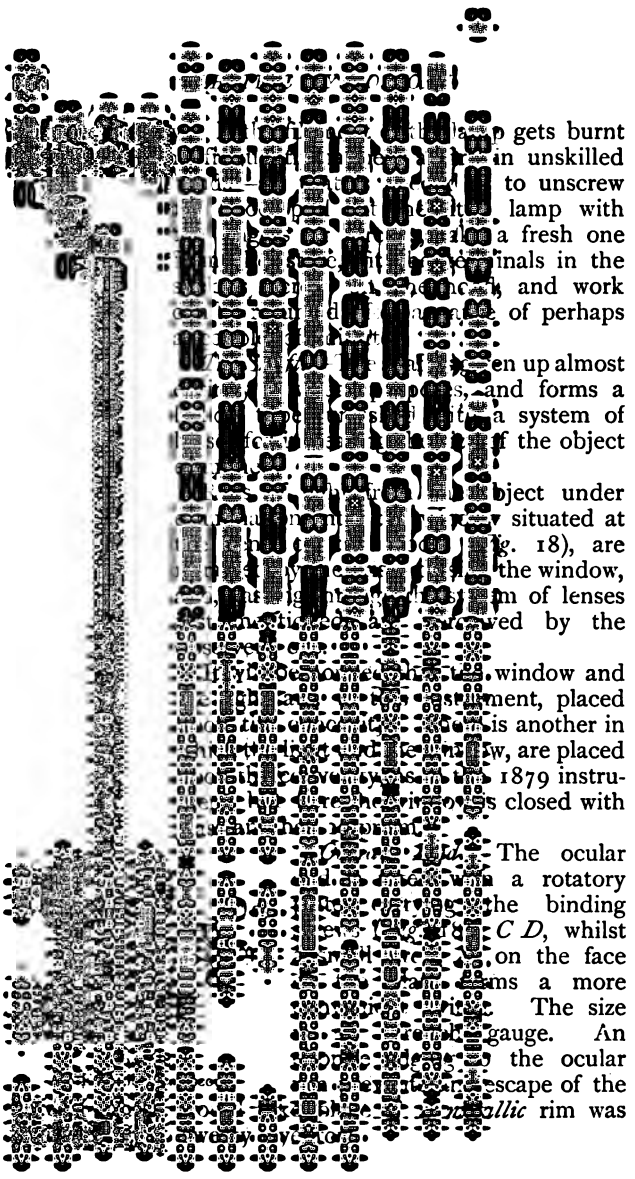


FIG. 17.
Anatomy of the Beak of Electric Cystoscope.

descent lamp (*Fig.* 17, *L*). The terminals of this "Mignon" lamp fit into two sockets, *C C*, which are in direct communication, by means of insulated surfaces,



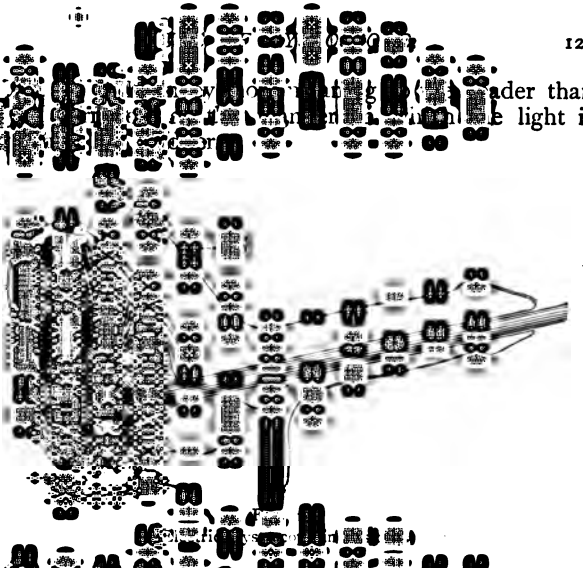
gets burnt
in unskilled
to unscrew
lamp with
a fresh one
inals in the
and work
of perhaps

en up almost
and forms a
a system of
f the object

bject under
y situated at
g. 18), are
the window,
m of lenses
ved by the

window and
ment, placed
is another in
w, are placed
1879 instru-
s closed with

The ocular
a rotatory
the binding
C D, whilst
on the face
ms a more
The size
gauge. An
the ocular
scape of the
allic rim was



ful hands
ng out of
nagement
ounces of
l must be
eans the
and any
dies, and
ous mem-
through
tience is
cts of the

by many
Fenwick,
nderson,
lustrating
reflected
There is
ts it any
ure. Of

course we have to learn yet in many respects to recognize the disease in the picture, and may often be mistaken in explaining what we see, just as that occurs to the laryngologists, and very experienced ones, with diseases of the larynx. In many obscure cases of the uropoietic system the cystoscope will render great aid in arriving at a correct diagnosis. But, to be successful with it, it requires a close study and a great deal of personal experience."

Ought Electric Cystoscopy to supersede Digital Exploration? Can it afford us a diagnosis without a Cutting Operation?—Most agree with Dr. Nitze[178] in his contention that digital exploration for diagnosis is, in the greater number of obscure cases, quite needless, and that the electric light is, when used with judgment and experience, quite equal to the finger. To support these statements Mr. Hurry Fenwick[179] gave in 1890 a list of the first forty-three cases in which he used the light for diagnostic purposes. These forty-three cases serve to compare with the list of forty-three published by Sir Henry Thompson[180] to illustrate the operation of digital exploration.

The comparison of the two methods and lists permits of the following statements being made :—

(1,) Digital exploration is a cutting operation, needing confinement to bed. Electric cystoscopy can be performed routinely and rapidly in private or out-patient practice.

(2,) The former operation needs an anæsthetic. In the latter it is not absolutely necessary. In the greater number of cases he has neither used gaseous narcosis nor cocaine. He employs anæsthesia (*a*,) in females for delicacy ; (*b*,) in tuberculosis or similar cases where the prostatic urethra is extremely sensitive ; (*c*,) in order to make a leisurely prognosis of a discovered growth so as to determine the expediency of operating.

(3,) Digital exploration is not absolutely free from risk or hæmorrhage, and frequently either a troublesome fistula or a hyper-sensitive scar is left in the urethra. Cystoscopy is, if it be gentle and purposive, as free from risk as routine catheterism or sounding.

(4,) In most cases the educated eye is to be preferred to, and relied upon, rather than the finger. It is well-known that Sir Henry Thompson trusts more to his sense of touch; but, on placing the diagnoses of these two lists side by side, it will be seen that the comparison is in favour of sight.

Sir Henry Thompson's List.	Cases.	Mr. Hurry Fenwick's List.	Cases
Nothing Found	14	Nothing abnormal seen	2
Calculi	2	Calculi	2
A scale of calculous matter	4	Renal hæmaturia ...	6
Tumours	20	Tubercular cystitis ...	9
Prostatic	2	Hæmorrhagic cystitis ...	2
Subvilloid condition ...	1	Tumours	15
	—	Chronic cystitis ...	7
	43		—
			43

(5,) The cystoscope affords not infrequently a sound prognosis, and intimates when to interfere and when to leave alone; if it indicates operative interference, it also points to the path (suprapubic or perineal) best suited for access to the growth, and for its complete eradication.

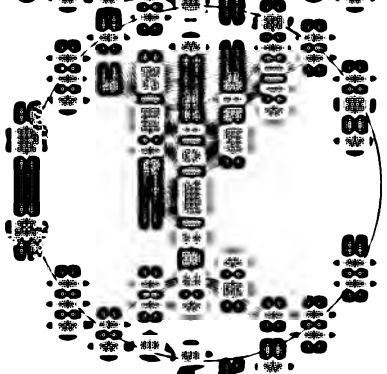
(6,) It must be readily admitted that digital exploration allows of the bladder being subsequently drained; but the rest thus afforded is not always necessary, nor is it always productive of benefit.

In what cases is the Electric Cystoscope of use?—Hæmaturia.—There are few cases more perplexing or more unsatisfactory to treat than those of hæmaturia, especially the "symptomless" variety. Very often the evacuated urine contains no clue as to the source of the blood. The colour of the hæmorrhage is deceptively variable, sometimes being of a renal, sometimes of a vesical type. In only a small proportion of cases does the microscope reveal the cause. Not infrequently bimanual or rectal examination proves valueless in the localisation of the disease, while the sound, evacuator, and lithotrite often afford only negative results.

It is in this very class of symptomless hæmaturia that the electric cystoscope is of so much value as a diagnostic

[illegible]

[illegible] of the ureters [illegible] renal source [illegible] the kidney [illegible] a villous



[illegible] orifice (Fenwick).

[illegible] existence of [illegible] cutting opera- [illegible] often cannot [illegible] ladder. It is [illegible] of the various [illegible] ty, and pain; [illegible] of the bladder [illegible] sted calculus, [illegible] the source of [illegible]

[illegible] ng from the [illegible] certainly de- [illegible] agnosed with [illegible] s replaced by [illegible] from a light [illegible]

[illegible] asily managed [illegible] of value in the

diagnosis of simple encysted calculus, or of that opprobrium of litholapaxy, "the last fragment."

Is the Cystoscope absolutely free from danger?—There is, as every surgeon is aware, some risk in the first introduction of any instrument through the deep urethra—a risk which must not be made light of. There is also some danger to be incurred in washing out the bladder for the first few times if residual urine be present; and, lastly, there are certain diseases such as tuberculosis of the urinary tract, which resent at once any instrumental interference.

The surgeon must therefore select cases *for routine observation* with care and judgment—those which his knowledge of the idiosyncrasies of urinary disease can assure him will be suitable. He must regard the cystoscope in the same light and with the same deference that he should regard the bougie, the sound, or the catheter; for, as Sir Henry Thompson [181] has so tersely and so wisely expressed it, "The introduction of an instrument is, more or less, an evil, never to be resorted to, unless a greater evil be present, which its employment may probably remedy."

Avoid using the cystoscope if the following conditions are present: (1,) Obvious tuberculosis of the urinary tract; (2,) *Traumatic* renal hæmaturia of recent origin; (3,) Irregularly enlarged prostates; (4,) Residual urine due to ataxia; (5,) Phosphaturia.

PHOTOGRAPHY OF THE LIVING BLADDER.

Excellent photographs can now be taken by means of Nitze's photocystoscope, of the normal and pathological states of the living bladder. The exposure is 3-10 secs. An atlas has been published with beautiful illustrations. This innovation demonstrates the accuracy of the cystoscope, for if a photograph can be taken, the eye can also view the surface easily. It only needs experience and constant practice to obtain comparative certainty of diagnosis.

SUMMATION OF THE VALUE OF THE ELECTRIC CYSTOSCOPE.

(1,) "Cystoscopy is an easy and harmless examination, but its successful employment requires experience; (2,) It should be performed as a *dernier ressort*, after all other well-known means for making a diagnosis have been exhausted; (3,) If properly applied, cystoscopy will generally clear up an obscure disease of the bladder; (4,) In most cases we can determine, with the help of electric illumination of the bladder, whether we have to deal with a disease of the bladder or of the kidneys; (5,) We can thus find out whether there are two working kidneys, also whether only one of the two kidneys is diseased, or both; (6,) We can thus make out, in certain cases, by observing *the character* of the jets of urine, especially by *timing their frequency and duration* at the ureteral orifices, whether the other kidney is doing the work for the one which is diseased; (7,) These facts will tend to make superfluous, in the majority of cases at least, a preliminary suprapubic or perineal incision for diagnostic purposes, as well as a nephrotomy performed for determining the action of the other (not diseased) kidney. They greatly widen and strengthen our means for determining the indication and prognosis of nephrectomy" (Meyer, of New York).

The electric cystoscope has also been used for educational purposes. The progress of the ordinary and easily diagnosable diseases of the bladder has been carefully watched, and the causes of special symptoms arising in their course have been thus determined. This insight cannot fail to have a decided influence in augmenting or correcting our knowledge of the routine diseases of the bladder and kidney. Some of the conclusions Mr. Hurry Fenwick [187] has arrived at are as follows:—

Surgical Renal Disease.

The dangers of performing nephrectomy without some investigation of the presence and working

capacity of the companion gland are obvious, but the difficulties of obtaining any correct estimate of the renal power which will remain after ablation of the diseased organ are avowedly great. Cystoscopy of the ureteral orifices removes much of the difficulty. The efflux establishes at once the presence of a working kidney. The sluggishness or rapidity with which the jets succeed each other marks a slow or active secretion, and the absence or presence of irritation in the pelvis (?). The strength of the jet gives some indication of the health of the ureter, of its dilation or otherwise. The colour of the jet, whether it be clear, muddy, or bloody, testifies to the normal or abnormal condition of the secretion. I have removed or explored the kidney on more than one occasion on the sole evidence of the stream from the ureter. Cystoscopy is especially valuable in early carcinoma or tuberculosis of the kidney, for statistics show that all interference is useless in these conditions unless it be in the very earliest stages. The ureteral orifice, moreover, becomes implicated by descending changes from the pelvis of the kidney. The shape and appearance, therefore, of its orifice are not unfrequently an index to the change in the corresponding pelvis and ureter. More especially is this the case in scrofulosis.

Bladder Conformation.

A natural ledge, formed by the inter-ureteral bar—the base line of the trigone—is often seen by means of the cystoscope to be well developed even in healthy bladders. The weakest part of the bladder is apparently immediately behind this line, for in those which have had to overcome even a slight obstruction in urination, there is a more or less gutter-shaped depression of the entire wall apparent in this position. Lodged behind this ledge and in this gutter may be seen the smaller stones. Fasciculation and dimpling are not uncommon in healthy bladders. In rare instances the bladder becomes constricted like a cottage loaf, and the upper compartment readily conceals a stone.

CALCULI.

Stones in the bladder may be sometimes missed, on sounding, from a variety of causes which are demonstrable by the cystoscope. A small stone can be completely or partially engulfed in the approximated swollen folds of chronically inflamed mucous membrane. These folds can be seen in bladders which contain at the time of examination 4 ounces; when the bladder is distended to 8 ounces or 10 ounces the stones drop on to the base. Medium-sized stones (1 to 2 drachms in weight) are often lodged behind the inter-ureteral bar, and may be seen partially sunk in heaped-up swollen mucous membrane. Some stones are seen completely covered with flocculent mucus or with blood-clot. All such may be overlooked in sounding on account of the circum- or superjacent soft material. Stones in pouches (sacculated stones) are rare. They are missed for these reasons: (1,) The orifice of the sac is narrowed in incomplete distention; (2,) The orifice is further encroached upon when the mucous membrane lining the mouth is swollen and gelatinous with inflammation. It is therefore recommended in those cases which exhibit marked symptoms of stone and where the sound has failed to detect any concretion: (*a*,) That the patient be sent to bed for a week's absolute rest; (*b*,) That sedatives to the mucous membrane be exhibited for some days previous to again sounding for stone, in order to reduce the swelling of the surface; (*c*,) That the bladder be fully distended with urine or with boroglyceride solution; (*d*,) That the neighbourhood of the ureteral orifices be carefully searched with the point of the beak of the sound; (*e*,) If this fails to elicit the cause of the trouble then the cystoscope should be employed. The electric cystoscope in some of these cases has shown me very clearly the cause of the recurrence of stone after lithotapaxy. Not unfrequently I have seen a thin shell or crust of the calculus remaining adherent in some depression or in a pouch of the mucous membrane after the operation of crushing had been considered complete.

These shells or crusts form nuclei for the regrowth of the stone. The diseased surface ought to be treated by means of topical injections in the same way as the urethra, for the cystoscopist can always guide his guarded brush to the place where he has seen the application to have been needed. (*Cp. pages* 78, 85.)

Hæmaturia.

(*a*,) *Symptomless.*—Symptomless hæmaturia occurring in adults under forty-five years of age, without residual urine being present, is usually of renal origin, or due to an early stage of some form of growth springing from a part of the bladder away from the urethral orifice (usually from the posterior wall in the neighbourhood of the ureteral openings). (*Cp. pages* 95, 96.) It is a fallacy to believe that all bright symptomless hæmaturia originates in the bladder.

(*b*,) *Hæmaturia with Symptoms, such as Penile Pain and Frequency of Micturition.*—In the young, up to the age of twenty-five, the bleeding, if it be preceded by pain in the penis and frequency of micturition, is usually due to ulceration of the bladder—tubercular, scrofulous, or catarrhal—*if calculus be excluded.* (*Cp.* Ulceration of Bladder.) Darkish hæmaturia in males over fifty, if 2 oz. and upwards of residual urine be present, may be due to stone, enlarged prostate, growth or atony. The bleeding in all is increased by exercise, but *pain* and frequency is perhaps only *markedly* increased by exercise if stone be present or coexist. If the presence of calculus and residual urine are negatived, and the stream is strong and full, the prognosis is grave, for the question of soft growth has to be entertained. The only old fashioned rule which the cystoscope has proved to be reliable for indicating the source of any given hæmaturia is, "The appearance of blood at the finish of the micturition of clear urine denotes a vesical or a prostatic origin."

Ulceration of the Bladder.

It is perhaps hardly realized by the profession that a large proportion of the young adult cases complaining of

obscure pains in the perineum and penis, accompanied by frequency of micturition and hæmaturia, are ulcerations of the posterior wall of the bladder. Such cases in the young adult simulate stone in the bladder very closely, and the patient is sounded time after time without any different opinion being arrived at than the negative of calculus. The cystoscope shows the ulcerations at once, and appropriate treatment can be promptly adopted. Some of these ulcerations are scrofulous, others appear to be merely catarrhal, for I have known them last for two or three years without extending or evoking other disease. A certain proportion of them are tubercular, and these usually run a more or less characteristic course. The catarrhal and scrofulous ulcers evince, perhaps, a greater tendency than the tubercular to become encrusted with lime phosphate, so that ultimately a scale of cretaceous material remains overlying the ulcer and keeps up a constant irritation, and as often as not deludes an unskilful examiner into the belief that he is dealing with adherent or encysted stone. Such cases exhibit symptoms which are out of all proportion to the size or depth of the ulcer, and remind me forcibly in this respect of anal fissures. It is more than probable that to this class belonged the cases encountered by Sir Henry Thompson, and reported by him as "Digital exploration, nothing found except a scale of phosphatic matter adherent to bladder."[180] Such cases are greatly benefited by lactic acid injections, ½ per cent. to 3 per cent., given daily, or by scraping. It might be supposed that pellucid urine would exclude the presence of ulcerations of the bladder. This is not always so. I have seen deep ulcers with apparently clear urine. There is a near connection between these ulcerations and tuberculosis. Such ulcerations are easier seen than felt by the operation of digital exploration of the bladder.

TUBERCULOSIS.

There is no disease of the urinary organs capable of such accurate mimicry as tuberculosis. There

is hardly a common or well known disease of the tract which it does not simulate at one time or other of its progress. Bearing this in mind the practitioner should acquaint himself with the family history, and examine the urine for bacillus if the diagnosis remains obscure. The straining, frequency and pain on micturition observed in tubercular *renal* affections are not always due, as is taught, to reflex conditions. In many cases such symptoms are explained by great coincident swelling of the mucous membrane seen around the orifice of the bladder. This causes slight obstructive atony. It may also be induced by the direct irritation of the urine or by the implication of the subjacent prostate. The bladder appears to be most often the origin of primary urinary tuberculosis.

TUMOURS.

Vide Editorial on Tumours (p. 86).

DISEASES OF THE PROSTATE.

Irritable Bladder of Prostatic Origin.—For the irritable bladder connected with hypertrophy of the prostate, Mr. Harrison[182] recommends half grain cocaine rectal suppositories. He adds, "The constipation which follows the use of opium in cases of this kind often proves a most serious complication, and by deranging the liver and the digestive apparatus counteracts all the good effect of the sleep and quietude which is thus obtained. I have not found this to be the case with cocaine, and consider it of much service in various forms of vesical irritability."

The Dangers of Delay in treating Prostatic Troubles.—Dr. R. D. Webb[183] insists upon the culpability of delay in treating prostatic obstruction with the catheter. Of internal remedies he relies upon the following: Quinine (in engorged conditions following exposure to cold) should be given in decided doses in combination with Dover's powders. Ergot, ℥xxv every two or three hours in similar cases, and salicylate of soda, gr. x to xx, in chronically inflamed conditions.

The value of an Examination of the Prostate (per rectum).—Mr. Reginald Harrison,[184] in a post-graduate lecture attaches great importance to the examination of the enlarged prostate (per rectum), "as determining our views in reference to the patient's future when retention of urine is due to this cause. When this happens in a person with a hard nodulated prostate, where there is evidence to the touch that fibrous tissue predominates largely over the muscular, the power of the bladder seldom returns, and the use of the catheter is generally perpetual; and when on the other hand, the prostate is found soft and yielding

to the touch, indicating that muscle still prevails, we may as a rule anticipate complete restoration of function."

INFLAMMATORY DISEASES OF THE PROSTATE.

Prostatic Catarrh.—The late Mr. Berkeley Hill,[185] in a series of three admirable lectures on some affections of the genito-urinary organs, of which the following is a summary, states prostatic catarrh to be a very common accompaniment of chronic inflammation of the penile portion of the urethra. There is a liability of prostato-urethritis to arise in gouty people on small provocation, such as excessive acidity of the urine. Such affections are increased by specifics against gonorrhœa and usually assuaged by alkalies and colchicum. One chief symptom is the sense of heat produced by the passage of a sound over the membrano-prostatic urethra.

PROSTATOSCOPY.

The changes of the surface, as seen through the electric urethroscope, are granular thickening, enlargement of the papillæ of the surface, and erosions. Infiltration and condensation-changes in the membrane of that part of the urethra do not take place. The prostate becomes in catarrh regularly marked with slight elevations, and depressions of purple or crimson hue. In the depressions are placed little flecks of viscid matter. The shape of the prostatic portion varies considerably. When much congested, the surface rises into a rounded form. When congestion ceases, the surface sinks till nearly flat.

With mere prostatic catarrh the examination with the finger in the rectum does not usually detect any change of health. The treatment consists mainly of local applications and in a *régime* from which excitement and excessive exercise are excluded. The local treatment is repeated injections of small quantities of astringent solutions, *e.g.*, nitrate of silver. Occasionally the specifics, cubebs and buchu, sandalwood, copaiba, etc., are useful.

Prostatitis.

Symptoms.—In inflammation of the substance of the prostate, besides the symptoms of granular prostatitis, there are aching or stabbing pains in the anus, sacrum, or perineum; pain in the suprapubic region is a common sign. There are also radiating lumbar or femoral pains after exercise or long journeys, general langour, *malaise*, or depressed spirits. Increased frequency of micturition is often absent; when present, it is felt by day, not by night. The flow of urine is altered by delay at the beginning, which may amount to retention. Dull pain after micturition, sometimes spasms at the end of the flow, with a sense of more to come, are complained of. In cases of long standing, micturition during sleep is a symptom—constipation is almost invariable. When the congestion is great, there is pain during defæcation, and between the acts a sense of weight at the anus or in the perineum. Pain in the testes when it occurs is simply a neuralgia. There is constantly hypersecretion of mucus.

In some patients the organ recovers its natural condition in a few weeks; but usually the disease drags on a course more or less wearisome; thus the termination is very uncertain. Relapses are almost sure to follow, if the patient exceed in his diet or *régime*. In relapses small abscesses often collect in obstructed ducts, which usually empty themselves through a duct before accumulating much. Sometimes the inflammation spreads to the parenchyma, and the prostate then becomes unyielding to the touch, hard, and sensitive. The enlargement of the organ may last long. The increase in size may be symmetrical, or only affect one part, giving the sensation of irregularity or lobular form when felt by the finger. In course of time, the nodules may disappear, and the organ regain its natural size, or even shrink below it, and feel quite firm and smooth.

Treatment.—The treatment of chronic prostatitis is very tedious. Of the many remedies in use, but few are trustworthy. General treatment only assists local reme-

dies. In the first place the dyspepsia must be cured. The tonics most beneficial are iron in non-astringent forms; nux vomica or strychnine are usefully added to the iron. Belladonna also may be added to the tonics, if micturition during sleep be a symptom. Ergotine is especially useful when the organ is large, and aching is caused by walking, or standing, or railway journeys. Oberländer recommends rectal suppositories of iodoform (*vide* p. 136). Freudenburg advocates rectal suppositories of ichthyol (4½ grs.).

When the organ is enlarged, soft, and not tender, a very good remedy is the cold sitz bath, taken at first for one or two minutes, once or twice daily, at a temperature of 50° F., gradually prolonged to ten minutes, and lowered to 40°. The cold douche on the perineum or anus is also useful. Cold enemata are more generally beneficial than baths, two to four ounces of cold water thrown into the rectum daily, and retained there; beginning at 45° F., and gradually lowered to 35°. Among recognized remedies is blistering the perineum, but Mr. Hill had no faith in its efficacy. Caustic injections are valuable if used after other means. The solution of 20 to 30 grains of nitrate of silver to the ounce is a good preparation, 10 minims being injected at a time. This has to be repeated several times.

Prostatitis from Masturbation or Excessive Venery.

Masturbation is a frequent provocative of prostatitis, sometimes in the acute form, more often in the subacute or chronic forms. In the mildest form of prostatitis through masturbation, the prostate bleeds easily, the urine is often tinged with blood, smoky, or even coffee-coloured. If felt per rectum, the organ is found little changed from the natural condition. General *malaise*, anorexia, and slight elevation of temperature usually accompany the bleeding Bleeding from the congested prostate may be copious in young men when it follows prolonged venereal excitement and excessive copulation.

Commonly very copious when thus originated it may be profuse for an hour or two, and exhausting.

Treatment.—In these affections the liquid extract of salix nigra, a drachm three times daily, has often a marked effect in checking involuntary emissions, and thereby preventing the irritation and exhaustion and neuralgia which some persons feel after these attacks.

Sequelæ of Prostatitis.

Persons who have suffered from a congested prostate are liable to too speedy ejaculation during copulation. This may be so rapid, and erection so fugitive, that effective coitus is impossible. For such cases the liquid extract of damiana has sometimes a powerful effect. But cure is almost hopeless if continence is neglected. Some persons give way to the sexual appetite without limit. Then follows a condition of great helplessness. The intense neuralgia of the lower extremities which follows the shortest walk renders exercise impossible. Pain is rarely absent, even when at rest; it extends from the sacrum along the spinal column to the occiput. The digestion is deteriorated. Topical treatment, after the mucous catarrh and chronic inflammation of the prostate is quelled, must be laid aside. The best remedy is a life of quiet, absence of exertion of any kind; a long sea voyage is one of the best remedies. In rare cases chronic parenchymatous prostatitis excites temporary mania, which has erotic irritation for an early or leading symptom. It disappears if the patient recovers from the physical affection. Dr. Oberländer,[186] of Dresden, is quite in accordance with these views. He remarks that in about half the number of cases excesses of various kinds and masturbation seem to be the causes, especially in association with a predisposition to catarrh of the mucous membranes. The local trouble caused by chronic prostatitis is often slight, consisting in burning on micturition, especially after errors in diet, occasional increased urgency to urinate, and frequently nervous sexual weakness. Ejaculation is often premature, and coitus is followed by great

bodily and mental exhaustion. Sometimes the last named, together with various other nervous symptoms, are all that the patient complains of. The prostate, examined *per rectum*, is usually found to be more or less irregularly enlarged. As a rule one lobe only is affected, and can be felt to be soft and uneven, rarely or never hard. A feeling of pressure in the rectum and perineum may also be complained of. With the urethroscope changes in the urethral mucous membrane can always be made out. As general treatment, removal to the seaside or to the mountains, or residence in a well-managed institution is recommended, together with careful attention to diet and regular action of the bowels. Locally, iodoform suppositories, containing from ¾ of a grain to 1½ grains each, are to be used at night after clearing the rectum by means of an enema. In sensitive persons the larger dose of iodoform *per rectum* may give rise to symptoms of intoxication. Rectal suppositories of ichthyol are also recommended. The application of a 1 or 2 per cent. solution of nitrate of silver to the posterior urethra once or twice a week; the introduction of large metal sounds, and Winternitz's "psychrophore" are also frequently beneficial. The affection is very liable to relapse. The cases due to gonorrhœa get well soonest.

Suppurative Prostatitis.

Reverdin, of Geneva, records two cases of suppurative prostatitis which were successfully treated by evacuation and drainage through a perineal incision, the dissection being carried along between the rectum and prostate until the abscess was reached. This method is now acknowledged to be the best.

Tubercular Disease of the Prostate.

Etiology.—This frequently, according to the late Mr. Hill, follows gonorrhœa. In the early stages the symptoms, being those of catarrh, escape notice, and the tubercle in the prostate cannot be detected by the finger until it has become considerably developed.

Early Symptoms.—This catarrhal condition of the prostate, with slight irritation of the bladder, lasts an indefinite time; eventually attention is directed to the prostate by the occurrence of other symptoms, such as frequent seminal emissions, or by weight in the perineum and pain in the sacrum. In other cases, the patient notices increased frequency of call to micturate, but a slowness in starting the stream of urine; then he feels a burning or cutting pain during the flow.

Later Symptoms.—As soon as the shape and consistence of the prostate are altered, the finger in the rectum finds the prostate irregular, perhaps larger than natural; tender, particularly at the posterior part near the trigone. The disposition of these irregular thickenings is variable. When cystitis is developed, copious viscid pus mixed with shreds and blood-clot form the urinary sediment, and the urine contains albumen in considerable quantity. The further progress of the case is accompanied by gradual participation of the ureters and kidneys in the septic inflammation, and the patient is gradually exhausted. Acute general tuberculosis may terminate his sufferings.

Cystoscopy of Prostatic Tuberculosis.—Mr. Berkeley Hill inspected two cases of advanced disease by the cystoscope, and found that the surface was irregular, with pits at the uvula vesicæ or neighbouring part of the floor of the bladder, which were partly filled with shreds of tissue, muco-pus, and blood-clot. In many cases, cystitis, ulceration, burrowing abscess in the floor and walls of the bladder are usually super-added before death.

Mr. Hurry Fenwick [187] published details of eight cases of tuberculosis of the bladder, examined by electric light, and is of opinion that if tuberculous ulceration is placed upon the trigone it is almost always secondary to a deposit in the prostate; if placed on the body of the bladder it is usually primary. The aspect of the ulceration in these two regions is somewhat different. That on the floor is usually more extensive but shallower, the ulcers having sharply defined

edges, whilst that on the posterior wall commonly exciting more inflammatory œdema appears deeper and more severe. (Compare "Electric-cystoscopy," p. 119.)

Differential Diagnosis of Tubercle in the Prostate.

In early cases the presence of tubercle elsewhere may be wanting, as the prostate is often affected before other organs. The disease most commonly suspected when tubercle is irritating the prostate, is stone in the bladder. The urine is at first only moderately turbid in both. In prostatic tubercle there is often a gleet, or history of such having continued since an attack of gonorrhœa; a little shreddy mucus may be washed out with the first portion of urine voided, the remainder being only slightly turbid. In stone, on the other hand, a drop of blood often comes at the end of the stream instead of pus at the beginning. When blood comes from the prostate it is usually washed out first as coagula mixed with curdy pus. If the patient be sounded and stone be there, it can be generally detected. Sounding does not always discover any alteration in the shape of the prostate or trigone, unless the tuberculous disease be far advanced. The distinctions of vesical tumour from prostatic tubercle are so great that confusion is not likely to occur. Tuberculous pyelo-nephritis creates symptoms which often suggest disease of the neck of the bladder. In these cases the absence of change in the condition of the prostate and the presence of tenderness in the renal regions indicate the real seat of disease.

Treatment.—In the early stages the catarrh must be cured, and the general treatment for tubercle applied. In the later stages the ragged cavities must be carefully washed out. A good antiseptic solution is sulphate of quinine, two grains to the ounce, two ounces being injected and left in the bladder after the pus and urine are well cleared out by repeated small injections of boric acid solution. Still more antiseptic is an emulsion of iodoform. In cases of chronic

cystitis, if the bladder is well washed, and a couple of drachms of this emulsion injected, the most fœtid ammoniacal urine is replaced by acid urine, fœtor disappears, and the pus rapidly diminishes. In cases of cystitis caused by neglect of prostatic retention, the urine in ten days becomes quite free from deposit, and even when calculus, or tumour, or malignant ulceration co-exist, the improvement is enormous.

Iodoform emulsion has been used for some years with good results at St. Peter's Hospital for urinary diseases. Mr. Fenwick suggests that it is wise to suspend the drug when the patient TASTES the iodoform, for the first sign of toxic effects is the excretion by the salivary glands.

Penile Pain Due to Prostatic Stenosis.

Prostatic stenosis, causing very severe pain in the anterior extremity of the urethra, receives attention at the hands of Mr. Arbuthnot Lane,[188] and his experience is illustrated by a very important case. A man aged forty-two, whose mother had died of consumption, was seized with an almost unbearable pain in the floor of the glans penis. It was violent and constant. Suprapubic cystotomy was performed, all other methods of examination having failed to reveal the cause, and a stenosed prostatic canal was discovered. It was forcibly dilated, and the patient was temporarily relieved.

Concretions in the Prostate.

E. H. Keyes[189] records a case in which a large number of millet-seed prostatic concretions were removed by a perineal incision from a patient who had suffered from constant dribbling of urine, clear residual urine and urethral discharge being present. There were no symptoms of vesical calculus. The dribbling and discharge were relieved after three weeks' perineal drainage of the bladder. Mr. Hurry Fenwick has removed one hundred and twenty small concretions from the lateral and median lobe of the prostate of a man aged 50. They had caused agonizing micturition.

THE ENLARGED PROSTATE.

"*Senile Hypertrophy:*" *Is it curable?*—The distressing symptoms arising from senile disease of the prostate have hitherto either been palliated or treated with masterful inactivity. Progressive surgeons have at length directed their attention towards obtaining a "radical" cure by operative interference. Mr. Belfield,[190] of Chicago, and Mr. McGill,[191] of Leeds, working independently, proposed, and carried out, the suprapubic removal of the salient and offending portions of the diseased gland. Others have followed this example, and in spite of the unfavourable opinion of this operation, expressed by Socin, Guyon, and Sir Henry Thompson, this procedure has steadily gained in the estimation of the profession, and is to-day a well recognized and justifiable surgical procedure, applicable to a large number of cases; though many are at variance as to the exact indications rendering the interference justifiable.

It is allowed:—

(1,) That the suprapubic enucleation of large pieces of the obstructing gland is neither formidable nor fatal.

(2,) That Sir Henry Thompson's dictum, "that a confirmed atony of the bladder consequent upon prostatic enlargement is *incurable* even by the removal of the obstruction," is a fallacy founded upon a false hypothesis.

(3,) That *timely* and judicious surgical interference will prolong life, and in many cases remove that source of intolerable suffering which so often renders old age unbearable and death a happy release.

The following propositions are now generally accepted: (1,) That prostatic enlargements which give rise to urinary symptoms are intra-vesical, and not rectal; the severity of the symptoms in a case of hypertrophy of the prostate bears little or no relation to its apparent size as felt through the rectum.

There are many varieties of the intra-vesical growth: (*a*,) A projecting middle lobe—pedunculated or ses-

sile; (*b*,) A middle lobe with lateral lobes forming three distinct projections; (*c*,) The lateral lobes alone; (*d*,) A pedunculated growth springing from a lateral lobe; (*e*,) A uniform circular projection surrounding the internal orifice of the urethra ("collar").

(2,) That retention is caused by the valve-like action of the intra-vesical prostate, the urethral orifice being closed more or less completely by the contraction of the bladder on its contents.

(3,) That in many cases self-catheterism is the only treatment required.

But if the catheter treatment fails; if in spite of care and cleanliness, chronic cystitis supervenes, and the pain and frequency of micturition, despite the catheter, becomes intolerable, what operative measures are at the disposal of the surgeon?

(1,) The passage of the catheter may be facilitated by a permanent perineal opening (Whitehead's method). Six inches of sensitive urethra are thus saved from the irritation of the instrument, and the bladder is rendered more readily accessible and is more easily washed out.

(2,) Or the bladder may be relieved by permanent suprapubic drainage, as recommended by Sir Henry Thompson, the wound being fitted with an apparatus to conduct the urine into a urinal.

(3,) Or an artificial suprapubic urethra may be created (Hunter McGuire's operation). "The suprapubic opening *into the bladder* is made as low down on its anterior wall as possible. A drainage tube is kept in for a short time. The result is that the patient passes his urine through the artificial urethra thus formed. According to the reports of the operation the artificial urethra does not leak nor does urine dribble away, no matter what the position of the man's body. The urine is retained for several hours, often from four to six, and then passed in a steady stream thrown several feet from the body, the last coming in jets as from the natural outlet. The artificial urethra, or fistula, has the same relation

to the bladder that the spout of a coffee-pot has to the pot."

Such operations are often effectual and sufficient. If, however, the surgeon aims at a permanent cure, or if drainage should fail, he must adopt more radical proceedings and remove the obstructing portion of the prostate What methods are available?

(1,) Urethral prostatotomy, section through the middle lobe or bar by means of an urethral instrument; (2,) Urethral prostatectomy (Mercier's operation), removal of part of the obstructing lobe through the urethra; (3,) Galvano-caustic prostatectomy (Bottini's operation), also performed through the urethra; (4,) Perineal prostatotomy (Harrison's operation), median perineal section, with division of the floor of the prostate and subsequent drainage; (5,) Perineal prostatectomy, removal of the salient portions of the gland through the same route; (6,) Suprapubic prostatectomy.

Which of these three routes—the Urethral, Perineal, or Suprapubic should be chosen?—It is generally conceded that treatment to be effectual should (1,) for a time thoroughly drain the bladder; and (2,) permanently remove the cause of obstruction.

The urethral route is now judged to be in every way unsatisfactory. There are few, if any cases recorded in which the operation has proved satisfactory by this route, neither can the obstruction be thoroughly removed, nor the bladder subsequently drained.

Which then is the better route, the Perineal or the Suprapubic?—The greater security afforded by the improved method of suprapubic cystotomy, the successful results of the innovators, Belfield and McGill, corroborated by others, have enlisted a feeling in the profession strongly in favour of the high operation. It is moreover contended that by the latter route: (*a*,) Enucleation of the gland pieces can be performed with greater precision, and completed with greater certainty; (*b*,) Complete and most efficient drainage is ensured; (*c*,) The high operation is more generally applicable and is equally safe.

There is much to be said in favour of the perineal

route, and the final decision must at present be left to time, increased experience, and more certain diagnosis of the exact condition of the intra-vesical growth. There are difficulties in the way of estimating accurately the amount of the gland which will have to be removed in order to cure the patient. Greater precision has been lately obtainable by means of the incandescent-lamp cystoscope, aided by Mercier's rectangular sound, or Gouley's cysto-pylometer (a modification of Mercier's instrument, which resembles a lithotrite). Doubtless, in the future, each variety of intra-vesical growth will be approached by the route indicated by experience rather than by fashion, the pedunculated median lobe being attacked from the perineum, whilst more extensive removal will demand, as in the case of multiple or extensive vesical tumours, the greater freedom and precision afforded by the high operation.

There is a general feeling against performing suprapubic prostatectomy when rigors and fever are present.

Charles K. Briddon [192] reports a case in which he operated with success when the temperature was 104°, and when the general condition of the prostate was very bad. In criticism upon this case the collaborator points out that the symptoms of prostatic retention had only been in existence two weeks, and it is quite otherwise when rigors ensue during well advanced catheter life. In such cases the kidney is probably gravely affected, and prostatectomy is unfavourable.

Published Views of the Operation.

T. Eigenbrodt,[197] of Bonn, reports five cases in which Prof. Trendelenburg operated for the radical cure of prostatic enlargement, and expresses in the following propositions his views as to the value of this treatment: (1,) It has been shown by experience that a radical operation is possible in almost every case of obstructive enlargement of the prostate. Such treatment consists in suprapubic prostatectomy in which all those portions of the enlarged prostate which protrude into the bladder are, if possible,

removed; (2,) The prospects of prostatectomy are better the earlier the operation is performed, and operations done early and before the development of cystitis are to be recommended in all cases in which the surgeon may avoid setting up inflammation of the bladder by the operation itself; (3,) Even in far advanced cases much relief may, under certain circumstances, be afforded by the operation, and the patient may regain the function of voluntary micturition; (4,) Patients who have been apparently cured by the radical operation are apt to be subsequently affected with persisting weakness of the bladder and accumulation of residual urine; (5,) In obstructive hypertrophy of the prostate the hindrance to the flow of urine does not consist so frequently as is generally supposed in a valvular occlusion of the internal meatus of the urethra by a prominent lobe of the gland, or by a displaced portion of the vesical wall. The hindrance is more frequently the result of a regular and general enlargement of the vesical portion of the prostate associated with the formation of a cul-de-sac in the bladder. Should the surgeon be unable in the latter class of cases to remove all the portion of the enlarged prostate which projects into the bladder, he should attempt to promote a free discharge of urine by making a deep wedge-shaped incision at the posterior border of the internal urethral orifice.

Dr. W. T. Belfield,[198] of Chicago, advocates perineal prostatectomy for feeble patients on the ground that its mortality is less in the proportion of 9 to 16. He gives a table of ninety-eight cases.

He claims that accumulated clinical observation proves: (1,) That in most cases the failure to evacuate the bladder is due in no wise to degeneration of the vesical muscles, but solely to the mechanical obstruction offered by prostatic growths; since the removal of such obstacles has been followed in over two-thirds of the cases previously dependent upon the catheter by restoration of the vesical functions; (2,) That the enlargement of the prostate commonly called "senile" hypertrophy is not limited to advanced life; (3,) That

the prostatic obstruction is usually of such form as to permit excision, for out of seventy-seven cases in which suprapubic section was done, in sixty-two, such obstacles were found and removed.

He admits, however, that in many prostatics of advanced age, a degeneration of the vesical walls co-exists, so that the contractility of the bladder is much impaired. Evidences of general tendency to sclerosis, as shown by rigid arteries, polyuria, often hæmaturia, extremely hard prostate, feeble flow of urine through catheter, and complete evacuation of the bladder only by pressure upon the hypogastrium, are the symptoms that point to degeneration, and render operative interference unpromising.

Dr. Weir,[208] of New York, declares that in his judgment the removal of obstructions of prostatic origin will afford the greatest success in those in whom the interference with urination has lasted but a comparatively few years —in other words, where the secondary changes in the kidney have not advanced to a very serious extent. "This factor is an important one concerning the reserve force of the patient, since to the suprapubic section one may be forced to add a perineal incision in order to thoroughly accomplish the removal of the obstruction, particularly at the lower margins of the vesical orifice, and possibly in the prostatic urethra itself." He asserts that the scissors in the removal of the prostatic outgrowths is an unsatisfactory instrument, and he proposes to use an amygdalotome.

Mr. Mansell Moullin,[207] supports the contention that the prostate gland is a purely sexual organ, and so long as it is normal, it has nothing to do with micturition; that its overgrowth is a purely local affection; that the complications are the direct result of the obstruction; and that removal of the obstruction will prevent their development.

In criticising the operations, which have been devised for the relief of the complications arising from enlargement of the gland, he asked three questions. The answers to these are based upon a review of ninety-four

cases which he has collected from various sources. *After the removal of the obstructing lobe, will the growth recur and render the operation valueless?* Definite recurrence has been noted in one case, and that within nine months, but the clinical evidence is very satisfactory, a large proportion of the patients operated upon regaining power over their bladder and retaining it unimpaired for three or four years.

The next question propounded was, *Will the bladder recover upon the removal of the obstacle?* In dealing with this, Mr. Moullin says: "The question of recovery of the bladder depends partly upon the condition of the patient as regards general nutrition, partly upon the extent to which the muscular coat has been ruined by over-distension, cystitis, and the repeated use of catheters. Nineteen cases in all failed, but in four of these either the whole obstruction was not removed, or no attempt was made to close the suprapubic opening; in two others there was already a fistula owing to the previous removal of a vesical tumour, and another was a very feeble old man who became insane shortly after. These, at least, must be deducted, and in several others there were mitigating circumstances. It cannot, however, be too plainly stated that the real reason why the bladder failed was that the operation was performed too late. Sir H. Thompson has written that habitual catheterism (for retention in cases of enlarged prostate) for two years will permanently destroy the power of the bladder to empty itself; and although McGill has shown that this is by no means so invariable or so positive, it is certainly one of the strongest arguments in favour of early operation that the chief palliative measure that replaces it, may within two years—*will*, according to Sir H. Thompson—so ruin the bladder that it can never recover."

The third question was, *Does not the operation involve too great a risk to life?* In answering this, Mr. Moullin considered the perineal operation separately from the suprapubic. Of the thirty-eight cases of perineal operation undertaken for this purpose, and not as an

after-thought during lithotomy, only three died, and one of these was eighty years of age already, and in another the method adopted was unsuitable. The mortality from the suprapubic was 20 per cent.

Other Methods of Treatment.

1.— Castration.

White,[193] after an exceptionally lucid and impartial review of our knowledge of the enlarged prostate, the symptoms evoked by its presence, and the modern surgical treatment for the relief or cure of these latter, opens an important subject for discussion and trial as follows: "It occurred to me some time ago, if the analogy between uterine fibro-myomata and prostatic overgrowth was a real one, castration might have the same effect upon the latter that oöphorectomy has upon the former, and cause a shrinkage or atrophy which would result in the practical disappearance of the obstruction." Prostatic atrophy is known to occur in eunuchs, geldings, etc. White then proceeds to show that experimentally the influence of castration upon the prostate in dogs is very great, and is inevitably and promptly followed by atrophy, first of the glandular and then of the muscular elements of that body. In this White independently confirms the observations of Griffiths[194] and others. Upon these grounds he suggests the employment of castration as a therapeutic method in prostatic hypertrophy. It remains to be shown that castration will affect the hypertrophied prostate, for although there is no doubt of the intimate relation of work and growth between the testes and prostate, there is no evidence of the influence of the testes upon the diseased conditions of the prostate. Moreover, it is not yet ascertained whether or not mere section of the vas deferens would not be sufficient to cause atrophy of the corresponding lobe of the prostate in dogs. If a section or division of the vas was sufficient the operation would probably be largely resorted to.

Ramm,[199] of Christiania, reports a practical cure in two cases in which bilateral castration was performed;

Powell,[200] Haynes,[201] White,[202] and Meyer,[203] also record good results.

2.—Ligature of Internal Iliacs.

Bier[195] (Kiel), acting on the knowledge that various benign tumours of muscle, glands, and of the connective tissue series disappear upon the diminution of the blood supply, carried out ligation of the internal iliac artery in unilateral prostatic hypertrophy, and the ligature of both arteries in the bilateral form of the disease. In one fatal case the procedure was transperitoneal, and in the other two it was extraperitoneal. The decrease in the size of the prostatic enlargement in the latter two cases was most striking and most complete; the urine was spontaneously discharged immediately after the operation. No ill results to the circulation followed the intervention. These results would point to the cause of the trouble being in the vascular supply of the gland.

Willey Meyer[196] has tried this plan with excellent results as regards the prostate enlargement.

REMARKS ON SUPRAPUBIC PROSTATECTOMY.

Brilliant as is the result of suprapubic prostatectomy in favourable cases, yet it is not obtainable in all; thus, Dr. Meinhart Schmidt[211], of Cuxhaven, details the clinical history of a man, aged fifty-two, who had suffered for three years with chronic cystitis due to an enlarged prostate. Suprapubic cystotomy was performed, small calculi were removed, and the middle lobe of the prostate excised. Smart hæmorrhage ensued. There was no relief to the bladder symptoms. Median perineal cystotomy was therefore performed, and a permanent opening made, the patient carrying a permanent soft catheter of large size through his perineum, with benefit.

Mr. Buckston Browne[212] believes that in many cases of advanced prostatic disease, the sufferings of the patient are not due so much to cystitis as to an intensely irritating, intra-vesical prostatic growth. He reports a very successful suprapubic removal of four ounces of obstructing gland from a gentleman, aged eighty-three.

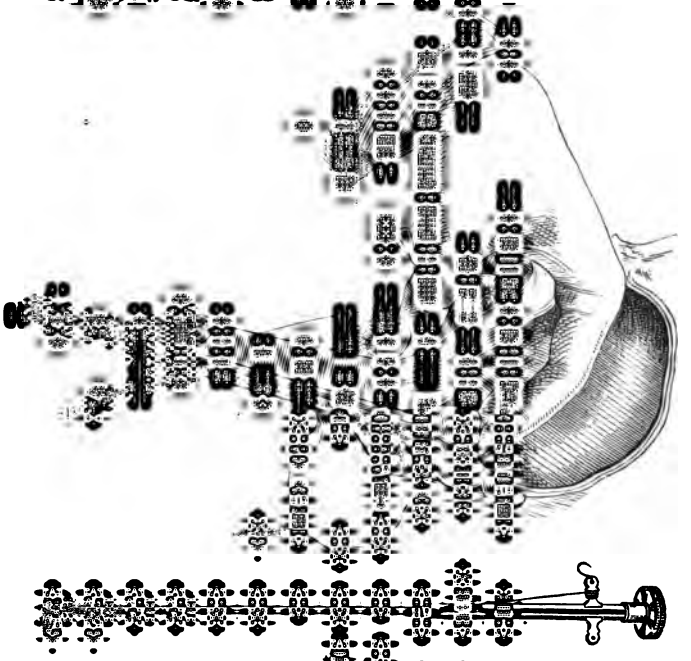
Mr. Arbuthnot Lane[213] in recording a case of suprapubic prostatectomy, makes the following very suggestive remarks: "Although such growths are, when examined in section, apparently but slightly vascular, it is not unlikely that they are subject to considerable variations in size. Though the mass removed in this instance was kept in a piece of lint moistened with glycerine and water, and was enclosed in gutta-percha, yet the following day it was found to have diminished in bulk by at least a third. The same congestion or erection accounts for the suddenness of the onset of retention, and for the excessive hæmorrhage which took place from its surface before the patient was operated on."

TECHNIQUE OF PROSTATIC OPERATIONS.

Points in the Technique of Prostatectomy.—The late Mr. McGill[214] laid down a few special points about the technique of suprapubic prostatectomy which are valuable: (1,) The quantity of water injected into the rectal bag, especially in cases where the prostate is abnormally hard, should be smaller than is usually recommended. In one case there was profuse rectal hæmorrhage, only stopped with considerable difficulty. In another there was considerable ecchymosis and abrasion of the mucous membrane of the rectum, and in another case of lithotomy hæmorrhage occurred. Each case must be decided on its merits, but six or ten ounces are usually sufficient; (2,) The bladder should be irrigated till the antiseptic solution used is returned perfectly clear. The quantity left in the bladder varies much, from ten to twenty or more ounces. The hand placed on the hypogastrium will show when the distention is sufficient; (3,) In cases where the bladder is contracted with thick non-distensible walls, it will usually be inadvisable to perform this operation; (4,) It is better to leave a catheter in the bladder till its cavity is opened, as it is a guide that expedites the operation. Care must be taken not to hook the peritoneal fold (superior false ligament) into the wound with the point of the instrument; (5,) The linea alba is best

divided by incising it immediately above the symphysis, and then by dividing it upwards on a director; (6,) Care must be taken to secure the bladder before proceeding to remove the prostate. This is best done by inserting two sutures through each lip of the bladder wound, and by fastening it securely to the deeper part of the abdominal wall. When the operation is completed, a third suture passed through the lower angle of the wound is an additional security against urinary extravasation into the retro-pubic space; (7,) The prostate should be removed as far as possible by enucleation with the finger, and not by cutting. The mucous membrane over the projecting portion having been snipped through, the rest of the operation is completed with finger and forceps. In this way excessive hæmorrhage is prevented. A pedunculated middle lobe can, however, be removed by cutting through its base. Hæmorrhage is best arrested by irrigation with water so hot as to make it unpleasant for the hand; (8,) A large tube should be inserted into the bladder, and the wound united above the tube, by a deep and superficial row of sutures. The tube is to be removed in forty-eight hours; (9,) The after treatment consists in keeping the parts clean, and washing the bladder and the wound —in exceptional cases—with a boracic solution.

The Prostatic Écraseur.—Mr. R. F. Tobin[216] successfully attacked and removed a salient horse-shoe collar of intravesical outgrowth by means of an écraseur (*Fig.* 21) introduced per urethram, the loop of wire being slipped over the projecting lobes and held in position by the forefinger, introduced into the bladder through a suprapubic opening. The patient was sixty years old and had suffered eleven years. The écraseur was extemporized in this way: A wire doubled and bent to a suitable curve was passed through the urethra into the bladder; a silver catheter was then slipped up along it, but its point, instead of being passed into the bladder, was made to impinge against the urethral obstruction. Next, the double wire lying in the bladder was opened out into a loop and slipped over the en-



23.

...craseur for ...state.

Removal of the Prostate by the Perineum.—Pyle[218] describes an operation for removal of the prostate which he performed with success on a patient aged seventy. The space immediately in front of the rectum and behind the bulb was chosen as the route. A semicircular incision was made immediately in front of the anus, and carried through the connective tissue between the bulb of the urethra and the rectum. This incision gives ready access to the field of operation, and there is little hæmorrhage. After the skin and tough fascia have been divided, the handle of the scalpel may be used to separate the loose connective tissues between the rectum and urethra, until the fascia covering the levator ani is exposed. After division of these structures the enlarged prostate will be seen. The finger is the most convenient instrument in this operation, and should be freely used in opening up the deeper parts. The

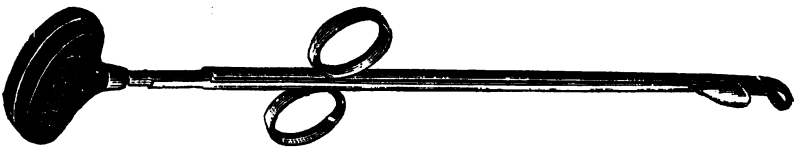


FIG. 24.
Norton's Prostatectome.

prostate is now seized with a pair of vulsellum forceps, and dragged to the surface, and the lobes removed separately if the gland is large. A curved steel sound should be introduced into the bladder before the operation, to indicate the situation of the urethra, and to keep the base of the bladder from slipping upwards whilst the prostate is being separated. Professor Dittel advocates a similar procedure, but the operation is severe.

Mr. A. T. Norton[219] describes his form of urethral prostatectome, made by Weiss, which works on the principle of a lithotrite. It consists of two blades, both of which are cutting, with keen edges, not riding over one another, but fitting edge to edge (see *Figs.* 24 and 25).

The sliding blade rises with a long incline in order to slip back over the middle lobe of the prostate when both

are in the bladder. The cutting edges are in the form of a scoop, to receive the segment removed. It is passed with the blades closed, over the prostate and turned down, *through a perineal incision.* The sliding blade is then withdrawn till it is felt to slip over the enlargement; and it is then forced home, removing a section of prostate.

FIG. 25

The Blades of Norton's Prostatectome

The mucous membrane is not as a rule cut through, and has to be severed with a knife in the perineum. There is practically no bleeding. The after-treatment consists in washing out the bladder with boracic acid solution every half-hour for ten hours, and every hour for the next twelve hours through a prostatic tube. The prostatic tube is removed within a week, and the perineal wound allowed to heal. Two successful cases are reported.

For Checking Hæmorrhage in Suprapubic Prostatectomy. —Two forms of hæmostatic tampons for checking the hæmorrhage, which sometimes ensues on the suprapubic removal of prostatic lobes, have been tried latterly, and have given satisfaction.

The original pattern was introduced by Keyes,[220] of New York. A square of four thicknesses of bichloride gauze is cut, the length of each side being six inches. Upon this are placed eight thicknesses of gauze cut square, each side measuring four inches; and upon these, eight other thicknesses of gauze also square, the side measuring three inches, are placed.

Centrally upon the three inch pad a small white shirt button is tied by stout silk ligatures, which are made to transfix the pad, and are then tied upon the six inch square surface. This central button also has

a piece of silk attached to it (*vide Fig.* 26 *B*), running out freely in the direction away from the three inch surface. This is to facilitate extraction. Each of the corners is stoutly tied with silk, so that these and the central silk may be made all taut together when pulled gently upon in extraction.

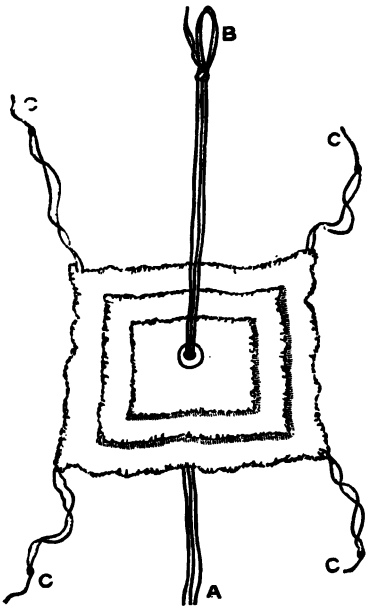


FIG 26
Keyes' Hæmostatic Tampon.

Keyes passes a soft bulbous olivary French catheter through the urethra into the bladder, and out through the suprapubic wound. He then ties the ligature *A*, which has transfixed the pad from the three to the six inch square surface, to the bulbous end of the catheter and withdraws the latter along the urethra; by this means firm pressure can be exerted upon the urethral orifice and the funnel-shaped excavation of the prostate. Another method is to bring out the traction ligature *A* through a boutonnière incision, and to exert pressure downwards from the perineum.

Dr. A. T. Cabot[221] has used a tampon consisting of a long strip of gauze, the edges of which should be rolled in (*Fig.* 27) and stitched, so that there should be no loose frayed edges. A button is placed on the smaller surface, and is retained in place by transfixing the entire roll with a stout ligature *A*. This is employed in the same way as the Keyes' tam-

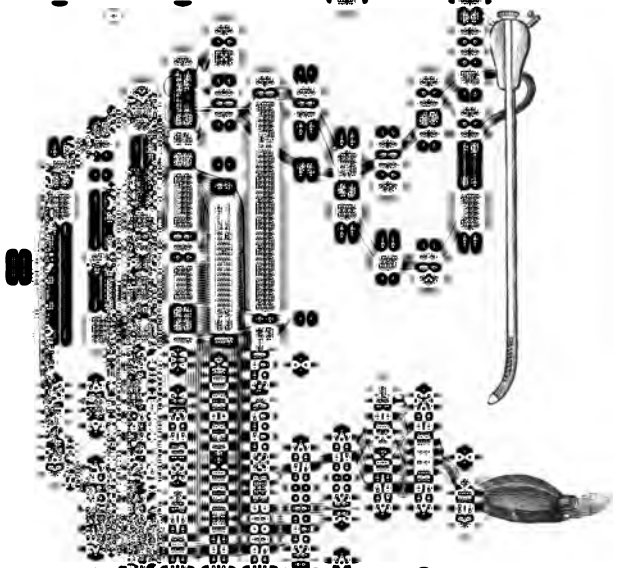
ening the
urethra
compress
a bulky

mpon.

swab the
d by the

ate.— The
consists in
the gland
ntroduced
ue collator
a limited

Two sorts
cautery plate
is inserted
low catheter,
te or knife,



Apparatus.

ds for cooling
instrument is
ed over when
searching for
use the beak
the cautery
hen switched
abersome and
ulators, which

Fifty-seven cases are now recorded by Bottini, with two deaths. In thirty-two cases a perfect cure was effected, in eleven there was an improvement, and in twelve the result was *nil*. The method is not altogether free from danger unless the greatest care is used. It should be reserved for cases in which strangury is persistent. It is contra-indicated when kidney disease is present.

Mr. Fenwick's modification of Bottini's instrument is so adapted that a current of much lesser degree is needed, and the hot plate is situated at the angle which the beak forms with the shaft (*Fig.* 29).

Electrolysis of Enlarged Prostates—Dr. Casper[223] after experimenting on prostates and testicles of dogs and rabbits, was encouraged to try the effects of electrolysis upon the hypertrophied prostate. The positive electrode, in the form of a plate, is placed upon the suprapubic region (bladder) and the left finger guides into the disinfected rectum the negative pole in the form of a needle. This is then plunged into the prostate. Two elements are switched on and gradually increased to ten or twelve cells for five minutes. The needle is then withdrawn and plunged into the prostate in another direction. This insertion is thrice repeated, the sitting lasting fifteen minutes. The strength of the current is to 10 to 20 milliampères. Four cases are given: two got much better, one was moderately improved, and one not improved at all. "The process does not seem to be without danger" (Furstenheim). Puncture with the platinum cautery after incision of the skin was recommended by Dr. Genzmer, of Halle, at the sixteenth Congress of German Surgeons, for the treatment of enlarged prostate. Prof. Volkman doubted its efficacy.

SUMMATION OF THE PRESENT POSITION OF SUPRAPUBIC PROSTATECTOMY.

As regards the technique of this operation, the adoption of the Trendelenberg position, the omission of the rectal

bag, the arrest of hæmorrhage by a Keyes' or Cabot's tampon (*Figs.* 26 *and* 27), the use of the écraseur introduced through the urethra (the mucous membrane being incised, and the wire being guided to its proper place through the usual suprapubic incision), are the modifications most worthy of mention. It is important, as White points out, to know how little we may remove of the obstruction with a reasonable prospect of cure or benefit resulting. It must not be forgotten, as Belfield has shown, that the object of the operation is "to restore a low level channel through the prostate, and is not simply the excision of the overgrowth." It must also be remembered that in a number of cases (Schmidt, Guyon, McGill and Belfield), various forms of obstruction due to *suburethral* prostatic growth have been found, and have either rendered the suprapubic operation a failure or have required special operative measures for their relief. The collator has made it a rule always before finishing the operation to ascertain that the urethral orifice is patulous, and that the prostatic urethra is not encroached upon by any small prostatic knot. Usually either of these conditions can be remedied through the suprapubic wound after the obstructing vesical outgrowth has been removed, and the extra incision in the urethral mucous membrane, and the stretching necessary in such cases "adds but little to the dangers of the case."

An interesting case in point is recorded by Bolton Bangs[222]: A man aged fifty-nine was relieved suprapubically of a stone, 400 grs. in weight, and two large cherry-sized prostatic outgrowths. The bladder was well drained, but he could only, as a result of the operation, expel a small quantity of urine, and was compelled to be on one side or the other, in order to accomplish this. At his very best he could only retain his urine two hours. Moreover, he was troubled with recurrent attacks of cystoprostatitis and was almost dependent on his catheter. After three years of suffering and futile medication, the bladder was again attacked by the perineum. The prostatic urethra was well dilated, and 1700 grains of calculus were removed; the bladder was freely drained

for four weeks by a rubber tube packed closely round with iodoform gauze. On the healing of the perineal wound he was able to urinate standing, the interval during the day being four to six hours, and seven to nine hours at night. Only two ounces of residual urine remained after voluntary evacuation, and the stream was strong and full, and was made with every sense of comfort. Bangs considers mere finger dilatation of the prostatic urethra through the suprapubic wound insufficient, and apparently advocates dilatation with a Dolbeau dilator in all cases. This is not usually necessary.

DISEASES OF THE SEMINAL VESICLES.

SEMINAL VESICULITIS.

Mr. Jordan Lloyd[224] draws marked attention to seminal vesiculitis which results usually from gonorrhœa. There is swelling at the base of the bladder, the greater part of which is due to effusion of inflammatory products into the perivesicular connective tissue rather than into the cavity of the vesicle itself, just as in epididymitis the bulk of the enlargement depends upon inflammatory infiltration into the connective tissue between the tubules of the epididymis.

The symptoms of vesicular disease are: Uneasiness about the perineum; painful defecation; frequent and painful micturition or retention; painful emissions at night; bloody semen; persistent gleety discharge.

Zeissl lays stress on one symptom which he asserts belongs exclusively to the disorder, viz.: erections are well-nigh constant, and so painful as to constitute priapism. A rectal examination reveals an elongated swelling beyond the prostate running obliquely upwards and outwards at the side of the base of the bladder, made more evident by passing a metal bougie into the bladder for counter pressure and counter search.

Mr. Lloyd thus describes a case and the treatment: "With a finger in the rectum, I found on the right side a deep-seated, smooth, round, fluctuating swelling, with its longest diameter in the direction of the bowel, and its lower end about one inch and a half from the anal margin. Pressure on this was painful and gave rise to a desire to micturate. Under chloroform I made a puncture through the perineum, inserting a long-bladed knife about one inch to the right and in front of the anus, and guided by the finger in the rectum entered

the blade to the depth of two inches, tapping a cavity containing about four drachms of pus. A finger passed through the wound entered a cavity which lay altogether to the right of the middle line up towards the sides of the pelvis. The cavity was drained with success."

Horwitz[297] treats chronic forms by long abstinence from sexual intercourse, cold to the perineum, and laxatives.

Excision of Seminal Vesicles.—E. Ullman[225] reports in 1889 the first case of successful extirpation of the seminal vesicles. Both the vesicles and the right vas deferens were ablated, the rectum having been first detached from the prostate by the prerectal incision. The future utility of this expedient is very small.

Roux[226] has twice ablated the seminal vesicles with the corresponding cord and testis. A lateral perineal incision is employed, and the prostate and rectum are separated.

Villeneuve[227] follows the cord along the inguinal canal, and by traction on it pulls up the corresponding vesicle and excises it.

DISEASES OF THE URETHRA.

INJECTIONS OF COCAINE.

Injections of Cocaine (20 per cent.) have been proved by Mr. Hurry Fenwick,[228] experimentally as well as clinically, to have the power of subduing pain in other parts of the body beside the urethra. His conclusions are that the application of a 20 per cent. solution to the urethra temporarily abolishes *slight* nerve irritations, such as slight neuralgia of the face, neck, chest, and legs, but that the drug has no effect whatever in cases where the pain is due to some severe form of nerve irritation, such as is experienced in cancer or acute inflammation. He uses the method for diagnosis of the amount of pain suffered. Cases are given of each class.

Deaths from urethral injections of Cocaine.—M. Simes[229] introduced a drachm of a 20 per cent. solution of cocaine into the urethra of a man aged twenty-nine, upon whom he intended to perform internal urethrotomy. Almost instantly the patient made a foolish remark, the muscles of his face began to twitch, the eyes were staring, the pupils dilated, there was frothing at the mouth, the face was much congested, respiration was interfered with; the attack ended in a violent epileptiform convulsion lasting for some seconds. These convulsions were continued with increasing violence several times a minute, the whole muscular system taking part in their spasms, requiring considerable force to keep him from falling off the table. The action of the heart was not much affected, and seemed to be only secondarily interfered with. It was the respiratory function that appeared first to fail, and then the heart's action became irregular and slow. The breathing was gradually more and more interfered with, the face—in fact the entire surface of the body—became deeply cyanosed; the pulse was slow, and at the end of

twenty minutes from the first convulsion had ceased to beat. All efforts of treatment proved quite unavailing. Nothing special was discovered at the *post-mortem* examination, congestion of the sinuses of the brain and of the lungs, and distension of the right side of the heart, being the main features.

Frank Glenn,[230] in 1891, recorded two cases in which alarming symptoms followed the injection into the urethra of a solution of cocaine.

Willey Meyer[301] barely escaped having a death in his consulting room after using two ounces of a 2 per cent. solution of cocaine.

Albarran[302] had a death with two ounces of a 1 per cent. solution.

Reclus[303] records a death.

Mr. Hurry Fenwick[231] has not as yet noticed any bad result from cocaine merely thrown upon the urethra or bladder, and he has used it routinely in a large out-patient vesico-urethral practice, as well as in lithotrity, internal urethrotomy, dilatation of stricture, and other operations on the bladder and urethra since its introduction in 1884.

If, however, cocaine is forced into a false passage freshly made in the urethra, or is injected under the skin, untoward results are apt to follow in a small proportion of the cases.

RUPTURE OF THE URETHRA.

Prof. Iversen, of Copenhagen, from a review of twenty-nine cases, agrees entirely with Cras, Guyon, and Terraillon, that the rupture is most often partial, implicating either the inferior or the lateral wall; that it is most frequently just in front of the triangular ligament; that the membranous portion is rarely ruptured unless fracture of the pelvis or disjunction of the symphysis coexists. He makes a rigid distinction between these two forms, for the latter most often results in rapid pelvic cellulitis, whilst the former gives rise to extravasation. The treatment Prof. Iversen recommends is catheter *en demeure*, or perineal incision according to the severity of the rupture.

Suture of Ruptured Urethra.—Paoli Erasme,[232] in giving a successful case of this procedure, quotes the results obtained by Kauffmann, of Zurich, in the immediate suture of transverse wounds of the urethra in dogs, and advocates the immediate suture of the ends of a ruptured urethra. Qénu and Picqué believe that urine will filter across the suture and provoke abscess. Lucas-Championniere condemns it as dangerous. Mollière performs it at a later stage. Cauchois,[233] of Rouen, insists upon immediate perineal section and suture of the ends, with subsequent *sonde à demeure* and antiseptic precautions in traumatic rupture. It is now submitted that the immediate perineal section and suturing with catgut or fine silk over a full sized gum-elastic catheter is the best method of preventing the subsequent stricture. Mr. Woolcombe[234] also records a case, having received the idea from M. Shield's article (*vide infra*).

Suture of the Urethra in cases of Perineal Section is advocated by Mr. Marmaduke Shield.[235] Three cases are brought forward, the result of suturing being that the union was speedy and complete.

Suturing of resected urethra dates from 1812.

STRICTURE OF THE URETHRA.

The use of sounds in Stricture is thus commented on by Mr. Teale[236]: "Let me sum up my own experience of the use of Lister's sounds, which for the last twelve years has been, both in hospital and private practice, most satisfactory. Since their adoption, as far as I can recollect, I have only once had to perform perineal section from inability to get through, or to satisfactorily dilate a stricture. I have never performed internal urethrotomy, nor felt the need of it. Rigors are extremely rare after the use of Lister's sounds. This rarity of rigor I am inclined to attribute to the fact that in nearly every instance dilatation has been carried at the first sitting up to ten, eleven, or twelve. It is my belief that full dilatation at the first sitting is safer than the older method of partial and gradual dilatation, and for this reason, even

in partial dilatation there is frequently some laceration or bruising of the surface at the strictured point. If the stricture be only partially dilated, there remains a narrowing at this sore point sufficient to materially arrest the flow of urine, and therefore there is urinary pressure on the raw surface, whereas in full dilatation the urine flows along the urethra equably and without undue pressure at any point, and puts no stress upon the tender and perhaps lacerated surface of the stricture. In a small number of cases I have failed to introduce Lister's No. 1, but these have been got over by the aid of Teevan's filiform guide, which in every case was successfully passed. The guide having been introduced through the stricture, its outer end is then screwed into the tip of a conical sound, like Lister's, with the bulb cut off. The filiform bougie guides the solid instrument through the stricture, and thus dilatation up to four or five (Lister) is secured, with the usual easy sequence up to twelve or fourteen."

Stricture of Large Calibre.

Mr. Otis[237] and Dr. Wm. White[238] write upon the surgical importance of strictures of large calibre. The former details some cases of genito-urinary disturbance, gleet, impotence, vesical irritability, in which full dilatation brought about a beneficial result. He advises that in obstinate vesical trouble of the latter character the surgeon should, especially if other means have failed, always try full and complete dilatation of the urethra.

Retention in Tight Stricture.

Mr. Reginald Harrison[239] in the treatment of retention due to tight chronic urethral stricture lays stress upon bringing the contracted urethra rapidly up to its normal dimensions, and obtaining free urine drainage and thorough cleanliness. He says, "Suppose the operator has succeeded, probably under an anæsthetic, in passing a No. 1 metal English catheter through a densely contracted stricture of half-an-inch or more in length, and

that he has verified his position (1,) by the escape of urine in drops by the catheter, and (2,) by his finger in the rectum. The instrument is firmly grasped by the stricture, and there can be no doubt as to the correctness of its position. Will this expedient serve to meet all the exigencies of the case, even supposing that the urine can be slowly drained off in this way? To tie such an instrument in the bladder, and to leave the urine to drain away indefinitely, is, I am sure, a most hazardous proceeding, though it may be accepted, as an alternative. In all these cases more or less acute cystitis has been in existence for some days, and the urine is high-coloured, offensive, and loaded with deposit, and what could thus be done would be to drain off the most fluid and least harmful of the contents of the bladder, leaving the more poisonous remainder to add to the mischief already going on in the bladder, ureters, and kidneys. Such a plan usually ends with the death of the patient in a few days of what may with truth be called a catheter fever."

Mr. Harrison advises that when there is no perineal tumefaction to require perineal section, and the catheter is merely persistently grasped within a hard fibrous stricture, other means must be taken at once to bring up the calibre of the urethra to something like its natural dimensions, so that the bladder may be kept thoroughly drained of all its contents. These means consist either in rapid dilatation or in internal urethrotomy. Every care must be taken to prevent the occurrence of any form of urethral septicæmia, as indicated by the occurrence of rigors and fever following the performance of the operation that was selected. As soon as the bladder is emptied with a large catheter, it ought to be thoroughly washed out with a perchloride solution of 1 in 5000; three or four ounces of this fluid are left behind. As a rule, no catheter is tied in. Before the patient is sent to bed the urethra is distended with carbolic oil (1 in 20), which is well rubbed into the part where section or divulsion may have taken place. Five-grain doses of quinine are given every four hours;

in some instances boracic acid appears to have answered equally well. They seem by sterilising the urine, to prevent rigors and fevers.

Operative Interference in Stricture of the Urethra.

(1,) *Antiseptic Precautions in Internal Urethrotomy.*—Dr. Lavaux[241] recommends continual washing of the anterior urethra, as well as intravesical injections (without a catheter) as antiseptic precautions which will render rapid dilatation the rule, and which will greatly reduce the danger of divulsion and internal urethrotomy.

Picard[298] and Mr. Bruce Clarke[299] advocate antiseptic measures prior to instrumentation.

(2,) *Dangers of Internal Urethrotomy.*—Mr. Hurry Fenwick[242] demonstrates anatomically the dangers of cutting on the upper wall of the membranous urethra with a Maisonneuve urethrotome. Details are given of two post-mortems which he had been requested to make on patients who had died of hæmorrhage after this operation. In both he found that the blade had severed the great postpubic veins at the apex of the prostate.

(3,) *Retrograde Catheterism (after Suprapubic Cystotomy) for impassable Stricture.*—This method was probably suggested by Mr. Howse,[243] of Guy's Hospital. M. Troisfoulaines[244] successfully practised this in a man, æt. forty. Dr. Vigo,[245] of Caen, reports another case where suprapubic cystotomy and retrograde catheterism were successful in a case of impassable stricture.

Mr. Thompson[240] gives a case in which he performed suprapubic drainage to cure old standing perineal urinary fistulæ. The case was successful enough to warrant his recommending in cases of long-standing fistula, with considerable riddling of the perineal strictures, in the first place, thorough slitting and scraping or clipping out of all the fistulous tracts; the retention of a catheter through the perineum for several days, so as to prevent the passage of urine along the old paths; and then the opening of the bladder above

the pubes by a small incision, so as to divert the urine in that direction. The suprapubic opening should be maintained until there is firm closure of all perineal fistulæ.

The question of suprapubic cystotomy with permanent perineal opening for traumatic stricture, has been submitted to the judgment of the profession by Mr. John Morgan.[246] A case is given of a boy who passed all his urine through fistulæ in the perineum after a traumatic urethral stricture. Suprapubic cystotomy was performed, a silver probe was passed (retrograde) through the bladder mouth and was cut down upon in the perineum. This was done that the utmost limit of the sound (post-strictural) urethra might be reached with certainty, and that the smallest possible wound should be made in the intervening parts.

EXCISION OF STRICTURE, ETC.

Resection of the Urethra for Traumatic Stricture.—Vignard[247] looks upon resection as the best mode of treatment in stricture of traumatic origin, giving a radical cure, while temporary benefit is all that can be hoped for from other methods. It is especially indicated in impermeable strictures following accidents, and in well-defined non-dilatable strictures. Fifteen cases are reviewed, and they show that the resected ends of the urethra can usually be brought together and sutured. It is important to unite the soft parts with great accuracy. Drainage is not necessary in most cases, but a retention catheter should be left in for *six* days.

Keyes[248] records a successful case of excision of stricture and urethroplasty, the grafts being taken from the mucous membranous portion of the foreskin. The cure at the end of a year and a half seemed complete.

Manley[249] advocates partial resection of the urethra as a method for radical treatment of rupture of the urethra, fistula, or organic stricture, and records two cases in which he obtained good success from the procedure. The operation, which dates from 1812, was made the subject

of a lecture by Guyon,[250] who stated that Roqués, one of his *internes*, had been able to collect sixty-four cases from all sources. Forty-nine of these were complete, and fifteen incomplete, resections. Guyon advanced nine cases of lesions of the perineal urethra thus treated in his own wards, six being by himself.

In all these cases, the operation was resorted to only when the passage of instruments was quite impossible. Four were traumatic, two were blennorrhagic. In two, there were fistulæ. In all, the entire calloused mass was removed, and prompt union followed. The patients ranged from fourteen years to fifty years of age.

From a consideration of his two cases, of another by Wile, and a fourth by Champonnière, in addition to those mentioned and recorded by Guyon, Manley postulates the following:—

(1,) In all cases of traumatic rupture of the urethra, the tissues should be laid open as early as possible, and the continuity of the lumen of the urethra should be entirely restored by urethrorrhaphy.

(2,) In those urethral perineal fistulæ which resist tentative measures, regardless as to their traumatic or blennorrhagic origin, they should be resected, and the continuity of the canal restored.

(3,) In rebellious strictures inappropriate for internal urethrotomy or divulsion, an external urethrotomy should be performed, and the opportunity seized to "hew a gutter through the cicatricial tissues," and to reconstruct the floor of the canal with the adjacent connective tissues.

(4,) In all cases, the most rigorous asepsis should be employed, and the aim in every case should be to secure non-suppurative primary union.

Jouon,[251] of Nantes, reports a case of rupture of the urethra followed by urinary abscess and considerable induration of the tissues, which he treated successfully by resection and suture. The resected segment measured ten millimètres at the upper and eighteen millimètres at the lower part. The cut surfaces were brought together with nine fine catgut sutures. The immediate results of the operation were perfect, and Jouon thinks that the

method should be applied to all undilatable strictures, whatever their origin. Quénu[252] has resected the urethra in one case with indifferent success. The patient was a horseman who had sustained a traumatic rupture of his urethra, and during a period of ten years had undergone internal urethrotomy five times and dilatation on several occasions. The man was in a wretched state, the urine being purulent and ammoniacal, and the bladder the seat of infective lesions. Resection of the strictured portion of the urethra was performed, one centimètre and a half being excised. A fistula was left, however, and the condition of the urine was but little improved, and Quénu thinks it probable that this was the cause of the failure of the operation. In any future similar case he proposes to prevent the infection of the operation wound by the urine by first making a provisional buttonhole opening in the membranous portion of the urethra. Desprès[253] points out that resection of the urethra is not a new operation, having been practised by Bourguet, of Aix. He thinks suture unnecessary after resection, as healing takes place by granulation if a catheter is tied in. In this way he cured a patient with a strictured and fistulous urethra, two centimètres of which he resected. The fistula left by the operation closed spontaneously in a few months.

ELECTROLYSIS FOR THE PERMANENT CURE OF URETHRAL STRICTURE.

Both the exponents and opponents of the efficacy of this method of treatment have been busy during the last decade. The late Mr. Steavenson and Mr. Bruce Clark[254] in 1886 revived the method which was introduced by Dr. Newman[255] in 1874. The special department which was started in 1886 at St. Peter's Hospital, London, to test the subject, has given the following result of its work. Thus, Mr. Swinford Edwards,[256] selecting only the severer forms, gives the analysis of twenty-four cases, of which three are recorded as failures. He gives his opinion as follows: "It is of the greatest use in strictures of

small calibre to facilitate the passage of a urethrotome, and in impassable strictures to render the passage of bougies possible. The more recent the stricture, the more it approaches the ring variety, the better the result. Meatal strictures are unsuitable cases." Again, Mr. Edwards believes the time is soon coming when internal urethrotomy would be almost, if not entirely, supplanted by electrolysis for strictures in the deep or fixed urethra, which were unfitted for the simple treatment of dilatation. Mr. Hurry Fenwick records his experience in the same department. "Electrolysis has proved disappointing, except in cases of *ringed recent* strictures, and in spasm of those of the deep urethra."

Mr. Tilden Brown[257] who gives an able *résumé* of the subject and literature, believes, from cases he has employed the method upon, that the only advantages it can claim is that it encourages patience and gentleness; that it furnished two important adjuvants in overcoming spasmodic stricture, namely, (*a*,) a lubrication of the canal; (*b*,) an anæsthetizing influence upon the terminal nerves at the irritable point. It increases, moreover, the exfoliation of hypertrophied epithelium of the urethra.

Prof. E. L. Keyes,[258] after giving a series of carefully recorded but disastrous cases, states that a weak current does neither good nor harm, and finishes with the following:—"I believe that a strong current is full of danger, both immediately from irritating effect and ultimately from cicatricial effect; and that employment of the negative pole does not prevent this. My study of the subject and the experience it has brought me, digested with all the impartiality I possess, lead me to state that the allegation that electricity, however employed, is able to remove organic urethral stricture *radically*, lacks the requirement of demonstration. The confidence of its advocates that it will radically cure organic fibrous stricture is, in my opinion, due either to the combined credulity of the patient and imagination of the surgeon, or to some special but fortuitous act of providence upon the co-operation of which, in the case

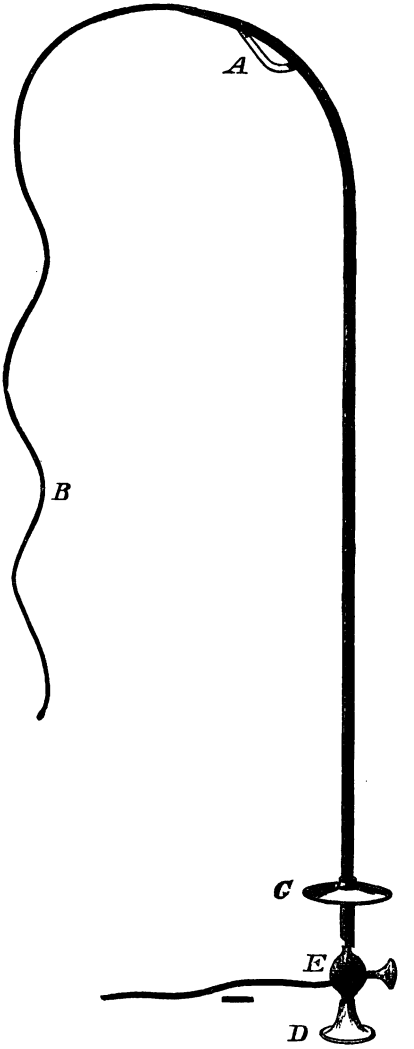


FIG. 20.
Dr. Fort's Linear Electrolyseur. *A*. Platinum Knife. *B*. Guide.

of his own patients, the general practitioner cannot with any confidence rely."

Dr. Ady,[259] of Iowa, records a death after electrolysis of the urethra.

Linear Electrolysis for Stricture.—Dr. Fort[260] describes a method for cutting through strictures of the urethra by means of electrolysis. His instrument is exactly like a Maisonneuve urethrotome, the blade being of platinum and connected with the negative pole of a thirty-cell battery. He used twenty milliampères, and "cuts through" the structure in two to five minutes. He claims there is never any hæmorrhage nor pain. It was condemned by the late Mr. Berkeley Hill and others as being clumsy, painful, and dangerous. Mr. Lavaux affirms that "cures" after linear electrolysis are no more permanent than after divulsion or internal urethrotomy.

Dr. Fort's instrument is almost identical with Jardin's urethro-électrolyseur used in Mallez's clinic, except that the blade is higher, and the instrument is composed of one instead of three pieces. (*Vide Fig.* 30.)

TECHNIQUE OF THE TREATMENT OF STRICTURE OF THE URETHRA BY ELECTROLYSIS.

As any success in this method depends absolutely upon following certain directions, the description of the procedure is given in some detail, and the article upon the subject by Mr. Bruce Clark[254] has been utilised for this purpose.

"When a solution of any salt in water is decomposed by electricity, the positive pole (anode) liberates the acid, and the negative (cathode) the alkalies or the bases. It has long been known that this law was equally exemplified in the human body, and advantage has been taken of it in the treatment of nævi. Whenever it is desirable that as small a scar as possible should result, as in cases of nævus about the face, the negative pole is employed, whilst in a situation where a scar is of no detriment the positive pole will do its work more rapidly and surely.

"In the far weaker currents which are employed in the urethra this difference between the action of the two poles is equally observable, and renders it absolutely essential that *the negative pole alone should be employed.* If the current be reversed during the process even for a few seconds, the acid which is then liberated gives rise to considerable pain, corrodes the electrode which is being employed, and often causes bleeding from the urethra, none of which phenomena are ever observable if care be taken to make use only of the negative pole and to employ weak currents.

"The next question to determine is what strength of current should be employed, and here one cannot too emphatically insist that the terms weak currents, strong currents, currents of ten cells, etc., should be for ever banished from medical literature. Newman speaks of a galvanometer to measure the current strength as a luxury, or something to that effect. I regard it as an essential, and I am convinced that no sure progress will ever be made with electrical applications till we measure currents as accurately as we register the temperature of the body by a thermometer. The sensations of the patient or the number of cells may, I will admit, form a fair substitute where no better means are at hand, but there is no excuse for employing them when a galvanometer is readily obtainable, which will do away with all possible sources of error. It should be obtained graduated in milliampères, which may for all practical purposes be regarded as measures of changes in current strength, just as the degrees on a thermometer denote changes in the temperature. A current strength of from two and a half to five milliampères is all that should be employed, and I would here again emphasize the fact that a cell which is capable of giving a definite strength of current one day may generate a totally different strength the next, from the fact that it has been weakened by continued use; added to this the cells of one battery differ in strength and size from those of another, hence a comparison by cells is not only useless but misleading.

"The exact kind of battery is of no particular moment provided that it is readily under control, and is of so simple a nature that the operator can readily set it right if anything goes wrong during the sitting. It should consist of some twenty-five or thirty cells of average size, certainly of not less than twelve or fourteen, each of which, when freshly charged, is capable of exerting an electromotive force of from one to two volts. I have generally employed a Stöhrer's battery, consisting of a series of zinc-carbon elements, but a series of Daniell, Grove, or Bunsen cells would answer equally well. For the purpose of electrolysis, if the battery is to work economically, the cells should be so arranged that each zinc plate is coupled to its corresponding carbon, whilst for the purposes of galvano-cautery where a "quantity-current," as it is called, is required, the battery should consist of a few large cells, or, what amounts to the same thing, all the carbons should be coupled together and all the zincs. At the same time the surgeon must bear in mind that a battery arranged for electrolysis is quite capable if too many cells are employed of producing a caustic effect, hence the need of a galvanometer to indicate clearly the exact strength of the current.

"The *instruments* (bougie-electrodes) to be employed are our next consideration.

"They may either be in the form of a simple red catheter to which a black (Brodie) handle is attached. Its tip, is made of metal (copper or zinc) which is nickle-plated, and is connected by a copper wire, passing up the centre of the catheter with a binding-screw, by means of which it is attached to the negative pole of the battery.

"There is, I imagine, a less danger of making a false passage with this than I had at first imagined, for where I have had an opportunity of treating an orifice stricture, as will be seen presently, it is clearly demonstrated that with such currents as one usually employs no solution of epithelial continuity takes place, so that a surgeon who knows his way in the

urethra should find no difficulty in giving these bougies that direction which it is desirable they should take. But besides this it is by no means essential that the bougie-electrode should pass through the stricture, the mere resting against it for a while rarely failing to effect some augmentation in its calibre. For most purposes, then, a series of bougies of various sizes will be sufficient, and the small sizes are not so essential as the larger, for in some instances I have rapidly dilated the stricture first to No. 5 or 6 English, and then used electrolysis subsequently. All the bougies are thoroughly flexible, and can be easily bent into any shape that the operator may prefer.

"It will be readily seen from the above remarks that the object of this plan of treatment is the absorption of the cicatrix which has given rise to the stricture. That absorption really does take place can be witnessed when a stricture at or within half an inch of the urethral orifice is submitted to treatment.

"In these cases the surface of the epithelium is seen to be gradually converted into a glutinous saponaceous-looking material, which bubbles up around the tip and sides of the electrode. If this material is wiped carefully away, the surface is seen to be red and somewhat congested in appearance, but it is perfectly evident that the epithelium is not entirely removed with such currents as I am in the habit of employing. It is moreover, evident that a narrow orifice, which is treated by allowing No. 4 bougie-electrode to pass through it, will three weeks later admit a No. 6 with ease, though no instrument has been passed in the meantime, presumably owing to a continuance of the process of absorption after the bougie-electrode is removed.

"No anæsthetic is in any case required, as the process is almost absolutely painless, the patient rarely complaining of the procedure in any way, usually describing it as consisting of a slight tingling or pricking. If the current causes any pain its strength must be diminished.

"It is most convenient to place the patient on his back and let him lie on a well-wetted pad about the size of the palm of one's hand or larger, which pad is connected with the positive pole of the battery. It is essential that the current from the positive pole should be distributed over a large surface and thus sub-divided, so as to avoid its destructive action on the skin. Occasionally it is necessary during the course of the operation to change the place of this pad on account of the burning sensation of which the patient complains.

"If the stricture has not been already carefully measured by means of bougies *à boule*, or by any other method the surgeon prefers, this must be done before the exact line of treatment can be decided on. Where one stricture only exists, that alone will require treatment, and the case is simple; but where more than one is present the most anterior should be treated first, and on a subsequent occasion the deeper strictures should be again carefully measured, as they may have in the meantime become somewhat enlarged in calibre. A bougie-electrode is selected which is about two sizes larger than the largest instrument which the stricture will admit: it is oiled and passed down, and allowed to rest by its own weight against the stricture. By means of the binding-screw at the top it is connected with the negative pole of the battery. The galvanometer is introduced somewhere into the circuit, *i.e.*, either between the bougie-electrode and the battery, or between the pad and the battery. It is preferable to place it in the latter situation, as it is less likely to be disturbed. One of its binding-screws, therefore, must be connected by a short length of wire to the positive pole of the battery, and the other by a similar piece of wire to the back pad. When all these details are completed, the battery is brought into action by lowering the zincs and carbons into the acid.

"For the first few seconds it is very likely that the patient will scarcely feel the pricking which is manifest

later on, as the resistance offered by the skin before it becomes thoroughly soaked is very considerable. Soon, however, the needle of the galvanometer and the patient's sensations clearly point out that the current is passing. If the current strength is more than 5 milliampères, or the patient complain of anything approaching to pain, a less number of cells should be at once resorted to. If the stricture that is being attacked is situated anywhere in the penile portion of the urethra, the surgeon will have no difficulty in determining whether the instrument is passing in the right direction; but if the stricture is situated more deeply, one finger in the rectum will readily indicate what is going on, should any difficulty be experienced. During the course of the sitting bubbles of gas can be seen and felt to pass up the urethra, and if the operation be performed in a bath the bubbling up of the gas forms a striking feature. There is no need to change the strength of the current unless the galvanometer or the patient's sensations demand it. After a period varying from a few minutes to half an hour, the bougie usually traverses the stricture. As soon as this takes place the current should be arrested and the bougie gently removed, no further operation being attempted for at least a week. It is better to wait a fortnight, or even three weeks.

"If the instrument does not pass the stricture in the course of half an hour it is better to withdraw it and wait for a future sitting; and if the urethra is irritable a much shorter time is quite sufficient. As a matter of precaution it is perhaps better if the stricture is small to keep the patient in bed for twenty-four hours, but excepting in one case, and that the first one which I attempted, I have never seen the slightest rise of temperature follow this mode of procedure. Strictures which are of moderate calibre may be treated by this plan whilst the patients carry on their ordinary occupations.

"The day following the passage of the bougie-electrode the patient usually complains of a slight soreness in

the urethra as if he had an attack of gonorrhœa, but this rarely lasts for more than forty-eight hours. After the lapse of ten days or a fortnight the urethra should again be carefully examined, when it will usually be found to admit an instrument one or two sizes larger than the bougie-electrode which was employed on the previous occasion. Thus if the stricture admits No. 4 before treatment, No. 6 bougie-electrode will probably be able to be passed, and a fortnight later No. 8 or 9 will pass without difficulty. If this be so, No. 10 bougie-electrode should be employed in the manner that has already been described, and its passage on this occasion will probably be only a matter of a few minutes. A further interval of ten days' rest will most likely enable No. 12 to pass."

GONORRHŒA, URETHRITIS, GLEET, &c.

Is the Gonorrhœal poison a Gonococcus?

A case of fatal endocarditis resulting from urethritis in a man aged twenty-eight is recorded, which adds weight to the accepted view that the gonorrhœal poison is a gonococcus.

There were numerous recent vegetations on the mitral valve, and numerous splenic and renal infarcts, mostly suppurating. By Gramm's method, masses of micrococci were found in the vegetations and abscesses, resembling some found in the pus from the urethra, where also a few forms like Neisser's gonococcus were detected.

Sinclair submits that the gonococcus may be latent in men and women, remaining in the recesses of the genital canal, and being excited to virulence by the congestion incident to coition or menstruation. To ascertain if the gonococcus is "latent," Sinclair practises the urethral injection of a mild irritant. If the gonococcus is found in the slight discharge thus caused, the individual is capable of infecting another.

Neisser, of Breslau, states that the germs do not remain attached to the epithelial surface, but that they often

penetrate very deeply and become fixed in their buried position, from which position they are able to cause recrudescence years after.

Persistence of the Gonococcus in Urethral Discharges.—Brewer[262] mentions a case in which gonococci were found six years after infection, and contagion took place on marriage at this date; but Goll[263] of Zurich has tested 1046 cases of gonorrhœa for the gonococcus, and the following table represents his results:—

TIME THAT HAS ELAPSED SINCE INFECTION.	NUMBER OF CASES.	GONOCOCCUS FOUND.	GONOCOCCUS NOT FOUND.	PER CENT. CASES WITH GONOCOCCUS.
4 and 5 weeks	85	40	45	47 per cent.
6 ,,	54	21	33	38 ,,
7 ,,	35	11	24	31 ,,
2 months	75	15	60	20 ,,
3 ,,	76	13	63	17 ,,
4 ,,	62	13	49	21 ,,
5 ,,	43	8	35	18 ,,
6 ,,	55	8	47	14 ,,
7, 8 & 9 ,,	108	21	87	19 ,,
1 year	83	12	71	14 ,,
1½ years	76	7	69	9 ,,
2 ,,	135	7	128	5 ,,
3 ,,	80	2	78	2½ ,,
4 ,,	37	0	37	
5 ,,	20	0	20	
6 and more years	22	0	22	
Total Cases	1046	178	868	

TREATMENT OF URETHRITIS.

Dr. Otis avoids specifics in the treatment of urethral discharges. He believes in deep urethral irrigation with hot water, and favours an injection of bichloride of mercury, 1 in 40,000 for acute, to 10,000 in chronic cases, given with Kiefer's two-way tube, and using from one to two quarts of the solution at ordinary temperature. This method, suggested by Dr. Halstead, of New York, has met with varied success, many discarding it after a short trial as worthless,

others meeting with excellent results. Thus it is strongly advocated by Dr. Brewer,[264] the strength of the solution being 1 to 60,000, or 1 to 40,000; recovery is asserted to be obtained in thirteen days. Inflammatory complications are 20 per cent. Mr. Rand[265] condemns the retrojection method in acute cases, but finds it of use in subacute and chronic cases. Dr. Otis indirectly reveals both the strength and weakness of the treatment, though without comment, viz., that in from six to ten days the discharge will generally, in fact almost always become thin, serous, and without colour, but will persist in this state for an indefinite period; or, if it be entirely checked, will relapse into the serous discharge again in twelve to twenty-four hours after the injection is suspended. Dr. Otis very wisely under these circumstances, advises, when the discharge becomes thin and painless, "a saturated solution of boric acid or potass permanganate, gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$ to the ounce, or alum and carbolic acid, till the cure is complete."

The late Mr. Berkeley Hill[266] gives the following analysis of the results of various forms of treatment in one hundred and ten cases of urethritis:—

Among the remedies used were soluble bougies, containing various drugs in amalgamation: fifty patients had been treated with this remedy, the average number being twelve per patient, although in one case forty-eight bougies were employed. In ten a cure was effected; two were treated by rhatany; one by sulphate of zinc and belladonna; four by chloride of zinc and belladonna; and three by chloride of zinc alone.

Thallin, as prepared in Christy's bougies, was tried in nine cases, with the following result:—None were cured, four were made worse, one was slightly benefited, and four were not improved.

Permanganate of zinc has been used by Mr. Hill for several years. It was first recommended to him by Dr. Alder Smith of Christ's Hospital; he prescribes it in all cases of urethritis, most frequently in the

acute form. Notes of its use were taken in seventy cases: ten were cured by it; in fifty-four it very greatly diminished the discharge; in four it did no good; and in two it made the discharge worse. Its use was particularly marked by the absence of any irritation. It should not be used in strong solution —one grain in eight ounces of distilled water is sufficient—and it should not be prescribed in conjunction with vegetable extracts, as an almost explosive mixture is thereby produced.

The sulphates of zinc, alumina, copper, and iron are most efficacious in the later stages of the gleet. They appear to be easily absorbed, and penetrate deeply into the inflamed tissue. The alumina and zinc salts appear to combine with the discharge without penetrating deeply into the mucous tissue. Sulphate of copper, on the other hand, penetrates deeper, and must not be used in a strong solution, as it causes slough, which leaves a scar behind it. These notes were taken by observations through the endoscope. Sulphate of iron is of no great value, but usefully affects the three preceding drugs. Twenty-five cases were treated with the four sulphates; in eight it was the third remedy employed, with four cures and four improvements. Used as the first remedy it cured twice and improved twice. The rest of the twenty-five it either cured or improved, with one exception. In that no improvement was marked. The strength of the solution as commonly used is:—

℞	Sulphate of zinc	30 to 40 grs.
	Alum	30 to 40 grs.
	Sulphate of iron	20 grs.
	Sulphate of copper	2 grs.
	Water	8 ounces.

In using a solution of nitrate of silver, small instillations are made on the points of disease previously ascertained. The strength of the solution is from 5 to 25 grains to the ounce—5 to 10 minims is the quantity injected. The irritation caused by this injection is unimportant. The effect passes off in a

day or two, and must be repeated every third or fourth day until the granular patches no longer exist. Where induration of the submucous tissue exists as well as granular patches, these unyielding parts are stretched in the passing of the bougie before the instillation of the nitrate of silver. The nitrate of bismuth has but a restricted value as an astringent. In some cases it does good, in others none.

For the value of chloride of zinc as an injection forty-three cases were analyzed. In seventeen of the forty-three discharge ceased after its use, in nine others it diminished.

Extract of belladonna and extract of opium, long used by the lecturer as sedatives, appear to have but small influence in that direction. Cocaine in five per cent. solution, applied before the injection is thrown in, is a very efficient anæsthetic when much pain is caused by the injection. Parenthetically it was remarked that during the acute stages of gonorrhœa, when scalding is severe, the injection of 10 per cent. solution of cocaine into the urethra entirely prevents the scalding pain of micturition.

Neisser considers strong caustic or antiseptic injections are harmful, from laying bare the deeper layers of the epithelium for the germ penetration.

The use of the urethroscope or of instruments generally is to be discouraged in the acute stage.

Neisser recommends free irrigation of the anterior urethra with 1 in 4000 to 2000 of nitrate of silver, or 1 per cent. solution of ichthyol, or of corrosive sublimate 1 in 30,000 to 1 in 20,000.

The salts of thallin have been the most widely advocated. The use of this drug seems to have arisen from the experiments of Schultz, Pisenti, and Dr. Kreiss[267] upon the action of sulphate of thallin on the gonococcus. Dr. Goll, Dr. Rose, Dr. Kraus, spoke well of it in 1887. Dr. Hugo Lohnstein[268] tried it in ninety-three cases by means of special bougies, called antrophores, made of 2 per cent. and 5 per cent. of thallin, gelatine, and glycerine. He obtained

good results. The drug is either applied in the form of an injection of the sulphate, 1 to 5 per cent., or in the form of a soluble spring bougie, 2½ to 5 per cent. Keyes[269] calls attention to the value of a 3 per cent. watery solution of thallin for posterior urethritis, and states the effects of the drug (which may be gradually increased in strength to 24 per cent.) is soothing and non-irritant. It is applied through a deep urethral syringe and catheter.

Dr. Margarith[270] recommends the injection of a solution of creolin, 5 to 8 per cent., administered through a hollow sound. Dr. Rademaker,[271] of Louisville, uses pyridine. Dr. Harmonic used iodised vapour (from heated iodine). Argyrism, after injection of nitrate of silver, was shown by Grunfeld,[272] of Vienna, by means of the urethroscope to take place.

Dr. Paul Thiéry recommends injections of finely powdered iodoform suspended in sweet-almond oil. He cites six cases which were cured in less than two weeks with about seventeen injections. Aside from its antiseptic properties, the injections of iodoform greatly relieved the pain of the disease.

Dr. Charles J. Smith,[273] by means of a specially designed urethral syringe introduces a mixture of olive and eucalyptus oils, which is made to traverse the urethra from behind forwards. He claims that in this way the inflamed areas are thoroughly disinfected in two sittings, and that within a week only a mild form of simple inflammation is left to deal with. He uses a mild astringent injection between and after the application of the ointment, but even this he considers is superfluous.

Additional Notes.

In the incubative stage, injections of warm water, or very weak solutions of pot. permang., or boracic acid, are useful; effervescing citrate of potash, internally, lessens fever, the pain in passing urine, and the tendency to epididymitis and bubo. In third stage, when scalding has disappeared, copaiba, or capsules of sandal-wood oil; if the discharge does not lessen, injections of zinc sulphate, gr. 3 to ℥j;

zinc sulpho-carbolate, gr. 2 to ʒj, or potash permang., gr. 1 to ʒj, should be used; should these fail, then inject gtt. 2 or 3, of solution of nitrate of silver, gr. 2 to 5 to ʒj, on to the stricture, by means of Erichsen's liquid caustic catheter; repeat this at intervals of five to seven days for two or three weeks; antimonial wine, ♏ 15 sec. hor. used in the inflammatory stage, with two leeches to the inflamed penis, and two in each groin, together with a very hot urethral injection of corrosive sublimate, 1 in 15,000 every hour, gave marked benefit in forty-eight hours. The injection is gradually increased to 1 in 5,000 later, and used less frequently. Injection of 2 per cent. solution of cocaine, retaining it about five minutes, and injecting four or five times a day, arrests the soreness and painful erections; Kava used also in acute cystitis, prostatitis, etc.; bougies with grooves, containing the following paste, ℞ cacao butter, 100 parts, nitrate of silver, 1 to 1·5 parts, balsam of copaiba, 2 parts. *Gonorrhœal Rheumatism*: Sod. salicylate; afterwards belladonna or blisters, according to the condition.

ELECTRIC URETHROSCOPY.

(Editorial by Mr. Hurry Fenwick.)

Electric Light Examination of the Urethra.—A simple, practical, and efficient urethroscope was placed in the hands of the profession in 1888,[274] by means of which the entire urethra could be brilliantly illuminated; so that those diseases of that canal grouped for convenience under the term "gleet," which sometimes prove so rebellious, and are often obscure in their causes, could be as scientifically studied as they could be effectively treated. The construction of this new urethroscope, which was designed by Lieter of Vienna, will be readily understood by a glance at *Fig.* 31.

"The illuminating power was very considerable. Every section of the urethra could be thoroughly examined, and every detail of its surface could be as easily studied as if the canal were exposed to bright sunlight. Any change could, with practice, be detected immediately.

could be
cannula,
ntern that

ments, could
ay the lens
of the light.
ment, the
ent of his
ime. The
ment, and
any of the
icture. It
d practical
sual know-
of stricture
stances en-
stricture'
n."

AERO-URETHROSCOPY.

Being dissatisfied, however, with the small size of the field, I adopted von Antal's[275] manœuvre of inflating the penile urethra, and obtained by this method a long flat wall instead of a small circle of lax mucous membrane crowded into the end of a small cannula. In 1890, Dr. Franz Hewel,[276] junr., of New York, apparently without knowing of Antal's work on the subject, advocated a similar expedient. As I have long given up the older form of cannula in favour of the inflating urethroscope, I append a woodcut (*Fig.* 32) of the instrument called by

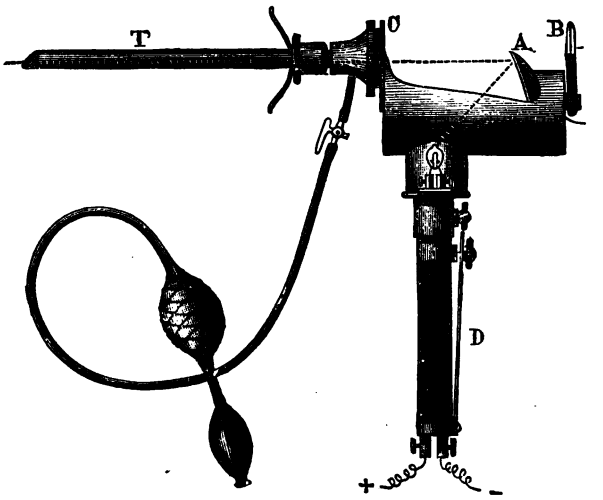


FIG. 32.

Diagram of Geza von Antal's Aero-Urethroscope.

Antal the aëro-urethroscope, being certain of the enormous advantage afforded by this modification. It has, however, a drawback, to which I shall allude presently. *Fig.* 32 needs no detailed description. The nose piece C is closed with an obliquely set glass diaphragm, so that air, forced into the cannula T by means of the india-

rubber ball, cannot but distend the penile urethra up to the commencement of the deep urethra (the compressor urethræ muscle). The cup at the proximal end of the cannula (*Fig.* 33) receives the convex glans penis, and

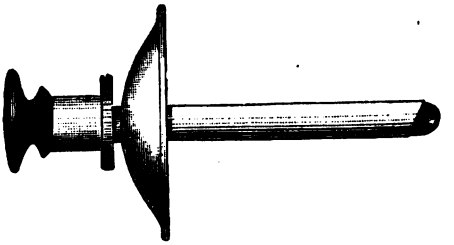


FIG. 33.

Urethral Cannula for Aero-Urethroscope.

effectually prevents the in-driven air escaping from the urethra, unless, of course, a great pressure is exerted. With the exceptions of the glans cup, the pressure balls, tap, and the glass diaphragm, the instrument is the same as the original Leiter (*Fig.* 31). It has one disadvantage. The glass diaphragm prevents any manipulation, such as swabbing, dusting, curetting, cutting, or cauterizing of the urethra under the direct control of the light, all of which is possible with the open or non-fenestrated nose piece. This difficulty is easily overcome. Leiter, of Vienna, has made me a very handy instrument (*Fig.* 34), partly at my suggestion and partly at Mr. Schall's. The diaphragm is only fixed by a bayonet catch or clip. Hence, when the granular patch, ulcer or tumour, has been discovered by means of inflation, the end of the cannula is held firmly in position, the diaphragm (*D*) is removed, and the operation proceeds through the open tube, under the direct control of the electric light. My new instrument is also fitted with various magnifying lenses, so that by turning the branch nose-piece, any lens which may be required to magnify the field at a distance corresponding to the length of any particular cannula, can be twisted into position.

nd experience
us membrane.
considerable
ow be readily
urethra, a long
e cannula can
friction takes
pen end of the
e openings of
lischarge, the
erations, false
ed, and their

nflation of the
the open nose
mploy curved
ndows. As in
a is affected in
The orifices

of the prostatic sinus, the sinus pocularis, and the verumontanum, are easily and plainly made visible by their means. One or two cautions only are necessary as regards the working of the aëro-urethroscope.

Dangers.—(*a*,) It is, in my opinion, unwise to use air pressure after a meatotomy, an internal urethrotomy, or in dealing with an urethra in which a false passage has been *recently* made. Air will freely enter the circum-urethral tissues under these conditions, and will produce surgical emphysema of the penis. The air will spread exactly like an ordinary extravasation of urine. I examined with inflation a patient who had had profuse bleeding from attempts at catheterism of a stricture some few hours before applying to me for relief. I was able to find the opening of the false passage with ease. It lay just below the pin-point orifice of the strictured part of the urethra, and it appeared as a bloody-edged, ragged, slit. But the patient called out almost immediately that something was running down the inside of his thighs, and I then became aware that air was passing freely through the opening of the false passage, and escaping into the tissues of the perineum. There was no doubt but that the false passage was very extensive. No ill result ensued, but it is easily conceivable that damage of a grave description can be inflicted by unfiltered air passing over an inflamed surface, and opening up extensive cellular planes in the thighs, perineum and pelvis.

(*b*,) I believe also, that it is best not to employ air pressure in acute inflammation of the urethra, for the air will only force the pus lower into the canal, and if the constrictor urethræ be weak, as sometimes happens, the inflammatory products will be blown into the deep urethra, and into the prostatic canal. I only use this instrument after the acute stage has passed, and take care to have the urine passed just before the introduction of the cannula, in order to examine and operate upon a cleansed surface.

Fallacies.—The inflation of the urethra can cause certain fallacies, which merit a passing notice:—

(1,) *Natural Fibrous encircling Rings.*—Here and

there along the normal urethra are incomplete or complete rings of fibrous tissue which surround the canal and lie close under the epithelial layer. When the lax mucous membrane is stretched out by means of air pressure, these rings stand out taut and conspicuous, the mucous membrane being bulged on either side of the thin fibrous band. As the mucous membrane is rendered bloodless by the pressure, these bands are of a brilliant white, and they may be mistaken by a novice for ringed stricture. In fact, I cannot help thinking that specialists may mistake these for large calibred strictures by the slight obstruction which they afford to the return passage of very large, bullet-ended, stricture searchers.

(2,) *The Peno-scrotal Angle or Fold.*—The penis is braced up by means of the suspensory ligament, and thus forms in its flaccid condition an acute bend at the peno-scrotal angle. If the urethroscopist looks at this bend without pulling the penis out horizontally, and without making in this way the penile portion level with the deep part of the urethra, this bend will appear as a fold, and will look exactly like a thick and tumid stricture of the canal.

(3,) *Network Fibres.*—In the normal bulbous urethra, the floor is covered with sparsely arranged interlacing bands of fibrous tissue. On extreme air distension, these white prominent bundles have the exact appearance of the commencements of stricture. They disappear at once on slightly relaxing the air pressure, whilst true incipient thickenings of the surface remain white and unpliably stiff.

(4,) *Paling of the Surface from Pressure.*—In the urethra, as in the bladder, any overstretching of the surface causes the mucous membrane to become unnaturally pale. By watching for a change of colour, one can very rapidly fix upon any spot which has not been rendered pale by the air pressure, for, when the surface is diseased and congested, its blood vessels are not readily emptied, and even if they are depleted the surrounding stain of inflammatory exudation still remains visible. One is accustomed to consider those patches which do not become

pale on pressure, as being unduly congested. In the majority of cases this is perfectly correct, but patches are met with, the relics of a subacute attack, where the injection is very slight, and in these the blood is readily driven out. They may be overlooked, therefore, if the urethroscopist is guided solely by colour. It is wiser, then, after a superficial search, to relax the intra-urethral air pressure, by permitting some of it to escape by the side of the mouth of the cannula. The mucous membrane will thereupon assume its normal tint, and the subacute patches will stand out in contrast redder and more injected than the rest of the surface.

The Clinical Value of the Aëro-urethroscope.—The colour of the urethral mucous membrane varies from that seen inside the lip (buccal cavity) to an intense red, according to the degree of congestion. In most urethræ the main vessels are seen running longitudinally, and between these trunks are the fine intercommunicating net-works of the smaller vessels. In some, these trunks are larger and more prominent than in others, and in these former the surface is "sweaty," that is, there is an abundant supply of urethral moisture, a condition often met with in prolonged gleet. In health the surface is glistening, and the reflection from this natural mirror economizes the light by increasing it. Where the epithelium has become changed or denuded, the light is absorbed, and the observer at once notices the dull dark aspect of the surface. This lack-lustre appearance is in itself a hint which no urethroscopist can neglect or overlook.

The Tonicity of the Constrictor Urethræ.—I have been in the habit of using air pressure to roughly estimate the "tonicity" of the constrictor urethræ, and I am more and more convinced of the utility and importance of this step. The long cannula is passed down the penile urethra until its end is situated about five inches from the meatus. On air being permitted to enter, the opening of the membranous urethra will be seen to be gradually thrust backwards. The mucous membrane at this point is gathered up into innumerable folds by means of the constricting action of the muscle which surrounds this part of the

urethra. As the pressure increases the junction of the bulbo-membranous urethra becomes funnel-shaped, and the apex—the opening—which is tightly closed by the resentful spasm of the constrictor in its attempt to exclude the air, now resembles a tightly compressed mouth. In normal urethræ the pressure of a full air bag will cause this orifice to open momentarily and to gulp down a mouthful of air, which gurgles audibly into the bladder, the patient usually exclaiming at the same time, not on account of pain, but from the discomfort and peculiar sensation such an introduction entails. In those within tendency to so-called "spasmodic stricture," not a breath of air will pass the barrier. In a small majority of healthy men, and in those in whom the muscular layer has been apparently weakened by gonorrhœal inflammation of the superjacent surface, the air passes into the bladder in long gushes. In these latter, I never order fluid injections, for in such patients inflammatory complications of the neck of the bladder and testicle readily arise with such treatment.

In certain cases the patient complains of "water hanging in the tube" after micturition, and is greatly annoyed by the escape of half a drachm of urine dribbling out into the trousers a few minutes after urination has been completed. In these cases the tonicity of the compressor urethræ is never perfect. Air inflation shows it to be either intensely spastic, or incapacitated by inflammatory infiltration. The former condition points to superficial erosion of the surface of the deep urethra, which needs special treatment. The latter requires massage and faradic currents.

Gland-guides to the grade of Urethritis.—In the penile urethra the opening of the urethral glands are often a useful guide to the stage and character of the urethritis. Even in the healthy "virgin" urethra the openings of glands are readily seen on inflation of the canal as red depressed specks along the roof. After the surface has become inflamed, their appearance changes, and the differences in the aspect, roughly speaking, is of three types. On the subsidence of the gonorrhœa or urethral

inflammation, the orifices of the glands will be seen to be wider than normal, and to be surrounded by a delicate rose-coloured blush. As the gleet becomes chronic the pinkish edge becomes purple and the opening is still wider. In a small minority (6 per cent. [?]) of old and obstinate cases of gleet, the glands will be seen to be distended, turgid with secretion, and white in colour, and they now appear like the swollen solitary glands in the small intestine. In the most aggravated form of urethral gleet they resemble slightly raised opaque pin-headed points, placed in double rows along the roof like so many buttons. The projection is apparently due to the hypertrophy of the surrounding tissue. I know of no class of gleet more obstinate or more unsatisfactory to deal with than that in which these peri-glandular swellings are visible. The thin gleety discharge, which is so intractable, apparently exudes from these glands. In some, who have "bursts" of pus for a day or two with intervening weeks of urethral health, it is often these glands which are the peccant factors, for becoming over distended with their secretion, they burst and give rise to a slight and transient circumjacent urethritis.

Congested Patches.—These appear, I believe, most often at the peno-scrotal bend, and not only induce gleet, but give rise to many uneasy sensations, such as tickling, fly or insect crawling, and burning about this region of the canal. They are best treated by gently swabbing the surface with a weak solution of nitrate of silver, applied through a tube passed down to this region.

Granular Patches appear at any part of the urethra, their favourite position being near the meatus. They are readily recognized by their velvety uneven papillary surface. The eye often catches the glint of the light, which is reflected from the tips of the papillæ. They are able to induce varied reflex neuroses as well as a distressing and obstinate gleet. The larger patches heal by gradual cicatrization and production of stricture. Careful application of iodine solution, or nitrate of silver, 2 to 5 grains to the ounce. is necessary, under control of the

light, so that only that part which is diseased is cauterized, and then only superficially and slightly.

Erosions, Ulcerations.—Superficial erosions are not uncommon, being especially found near the deep urethra, where they induce much spasmodic action of the constrictor urethræ. I cannot say that true ulcerations are often seen unless it be just within the meatus, or as the result of instrumental roughness. Both require stimulation. Primary tubercular ulceration is, I am sure, extremely rare.

Nacreous Patches are sometimes met with in the form of splashes of white sodden epithelium. They usually betoken infiltration into the deeper tissues, and indicate the site of future strictures.

Œdematous folds are perhaps best marked at the wrinkles which surround the opening of the deep urethra. I have seen them most pronounced in syphilitic subjects. They usually prove obstinate.

Strictures.—The instrument is of course quite valueless in the general diagnosis and treatment of stricture, but it is helpful in preventing much useless worrying of the urethra by establishing with certainty the existence or absence of stricture of "large calibre." I suspect many strictures are diagnosed which do not really exist, and in many cases of chronic gleet the practitioner jumps to the conclusion that a stricture is present because the gleet is unusually obstinate. This is the outcome of the teaching that "all chronic gleet means stricture"—a false theory. Very often I am asked to examine for gleet due to stricture and find none present, and discover merely an œdematous or acutely inflamed sensitive granular patch, which bleeds on being touched, its circumjacent muscle spasmodically resenting the passage of an instrument (Hilton's law).[277]

It is surprising how often a congenital fold on the floor just within the meatus will keep up an old gleet. These are readily seen, and often if they are divided, the congestion, or the irritating patch which lies just behind them, disappears, and with it the gleet. An

incipient stricture of the urethra is readily seen on distention of the canal with air, for the mucous membrane is bulged in front and behind it. If it be thin, it can be divided upwards by a harpoon knife, under electric light. In very large and non-recent false passages, in which a difficulty has arisen in introducing an instrument, I have used the light with great success, passing the whip into the real orifice of the stricture under the control of the eye.

Prostatic Catarrh.—In cases of vesical irritability due to prostatic catarrh, the surface is spongy, mottled and flecked with yellow or white, and the caput gallinaginis is not infrequently seen to be red, tumid, and enlarged. It flops into the open end of the cannula, and is easily cauterized. I often use the solid stick, applying it under control of the light to its surface, with a light and single touch. This turns the caput of a dull white, which contrasts sharply with the colour around. The stick is also used for the sinus openings.

Treatment, with the aid of the Light.

In the usual course of practice a large percentage of urethritis and gonorrhœal cases are healed either empirically by means of injections or balsams, or the disease burns itself out despite all that can be done for it. But a certain small proportion of the cases prove intractable; nothing seems to have any controlling effect. In these I am certain that the light is indispensable, and inflation is a necessary adjunct in the examination. Of all the solutions used in pencilling, swabbing, or cauterizing the various inflammatory conditions, nitrate of silver and iodine are the two most reliable.

It must be remembered, for it is not sufficiently realized by the profession, that very few cases (8 to 10 per cent. [?]) of intractable gleet are confined to the penile urethra. The deeper—the posterior urethra—is also generally affected as well, and needs attention. The disease will not usually be thoroughly eradicated until

this—the neglected part of the urethra—is thoroughly and topically treated, and with the same vigour and persistency which is devoted to the management of the anterior or penile portion.[278]

Dr. Oberländer[278] of Dresden who has contributed so greatly to our knowledge of chronic urethral diseases, uses that form of urethroscope in which the light is introduced into the urethra. But it is hampered by the necessary unwieldly cold-water cooling apparatus. A very light urethroscope has been designed by Dr. Otis,[279] though it lacks the most essential feature, in my opinion,—the power of inflation. The firm of Gebbert and Schall have constructed an urethroscope which I believe is destined to supersede Leiter's pattern. The light in it is concentrated from without.

PHOTOGRAPHY OF THE URETHRA BY ELECTRIC LIGHT.

Dr. Kollmann[280] of Leipzig has taken some very interesting and exact photographs of the urethra in its normal and diseased state.

NOTES ON "SINGLE" SYMPTOMS.

Incontinence of Urine.

Baruch[281] finds in the New York Juvenile Asylum nocturnal incontinence in 10 per cent. of the children, girls being equally affected as boys. He finds the best remedy to be atropine. Sufficient is administered at four o'clock in the afternoon to ensure dilatation of the pupil, and the dose is repeated at seven o'clock in the evening if the pupils have not been affected; $\frac{1}{64}$ grain is given to children from six to ten years old, and double that quantity up to the age of fourteen. If the afternoon dose has widely dilated the pupil, the evening dose can be omitted.

Dr. Gersuny[282] describes a new operation for curing complete incontinence in a girl aged fourteen years.

The urethra was laid freely bare up to the pubic arch, the external orifice was then twisted in its long axis through 180°, and fixed in that position by a suture. The success was incomplete. Three weeks later the orifice was twisted 90° more. A third operation in which a further torsion through 180° was performed. After this retention ensued, and the patient was catheterised for three days. She then passed water voluntarily and was free from incontinence. Five months later the patient was much in the same condition as other people. This operation has proved of value in other cases.

Mr. Jacobson[283] treated a case of diurnal incontinence by Sir D. Corrigan's method of painting the meatus with collodion, at first at intervals of every half-hour, and then every two hours. The result was successful.

Dr. Kupke,[284] of Posen, considers the cause of incontinence of urine either to be diminished activity of the vesico-spinal centre in the lumbar part of the cord, or partial anæsthesia of the sensory nerves of the bladder, both of these conditions preventing prompt information being conveyed to the cortex of the cerebrum when the bladder is becoming full. In cases where deep sleep occasions the brain to lose control over the bladder, it is well to keep a light burning in the room so as to lessen the depth of the sleep. After calling attention to a number of well-recognized causes of enuresis, such as phimosis, intestinal worms, etc., Dr. Kupke mentions Guyon's and Unverricht's methods of galvanizing the parts, the former by means of a urethral electrode, the latter by means of a large stationary positive electrode applied to the lumbar region and a small negative electrode moved from place to place over the pubes. He himself, however, prefers faradisation, combined with medicinal treatment. The former is applied by means of a large, flat, stationary, positive electrode over the last dorsal and first lumbar vertebræ, while a small negative electrode is applied with stroking movements over the region of the bladder. The most valuable drug is one which is but little known in this country—the sweet

sumach (rhus aromatica). The preparation he employs is the extractum fluidum rhois aromaticæ, of which from 5 to 15 drops are given night and morning in a little milk according to the age of the child. Treatment must in many cases be persevered in for three or four months in order to obtain a lasting cure. The well-known regimen as to fluids at night, a hard mattress, baths, etc., must of course be attended to. Strychnine, which used to be given before rhus aromatica was adopted, is best administered hypodermically—1 milligramme of the nitrate daily. Tincture of nux vomica is unsuitable.

The late Dr. Steavenson[285] described his method of treating incontinence as follows:—It is not exactly the same as that followed by Guyon and Unverricht. It was seldom that he had to pass an electrode into the urethra; and he thought that failure often ensued if the second electrode was "moved from place to place over the pubes." His reasons were that "the tendency of all electrical currents is to take the shortest route possible to complete the circuit, always of course choosing the road offering the least resistance. If one electrode is placed on the lower dorsal spine and the other above the pubes, the sphincter vesicæ is almost completely without the circuit, and then receives very little direct influence. In cases where there is weakness of the sphincter, unless an electrode is placed in the urethra itself, the most advantageous position for the second electrode is the perineum." He seldom used the interrupted current, although it is strongly recommended by Erb. His usual plan was to place a pad connected with the negative pole of a continous current battery over the lower dorsal region of the spinal column, and a small button electrode on the perineum. He advised that the electrode connected with the negative pole should be the fixed one, because of the sensitiveness of the parts to which the second electrode has to be applied, and the small space, and therefore the difficulty experienced in moving the electrode about. "In all cases a very weak current is used, and therefore

the fixed negative electrode, being of wide surface, does not painfully affect the back ; whereas, if the current were reversed and the button electrode in the perineum made negative, a weaker current still would have to be used to enable the patient to bear it." In the treatment of atony of the bladder, incontinence of urine, or undue frequency of micturition, he usually employed the current for eight to ten minutes every day or every other day; the great majority of cases only requiring about eight or ten applications.

Dr. Alejandro Settier[286] records two cases of complete incontinence of urine in which electricity was used with success. One was due to the atony of over-distension in a young man, the other case was the ordinary incontinence of childhood. Guyon's method was adopted.

PYURIA.

(*Compare Kidney, p.* 49.)

Pus in the Urine: How to discover its Source? is the question introduced by Keyes,[287] of New York.

Anterior urethral pus exudes from the meatus. This is almost conclusive evidence that the trouble lies anterior to the "cut-off" muscle (compressor urethræ) in the membranous urethra. In posterior urethral pus, there is no better expedient than first washing out the anterior urethra with a $\frac{1}{10}$ per cent. solution of salicylic acid. Then make your patient urinate in two clean glasses. Practically, the pus will be found in the first specimen, and the rest will be reasonably clear. If you suspect that the pus originates in a prostatic abscess, or the seminal vesicles, wash out the anterior urethra as before, and then make your patient pass water into three glasses. First let him pass about one-third ; then put your finger into his rectum, and press upon the seminal vesicles or the prostate, and milk the focus of suppuration, and the second third of the urine will contain the pus. The third part will be comparatively clear.

To distinguish between bladder and kidney pus: If

the pus has its source in the kidney, it is not flocculent, it is cheesy and heavy, and does not float like bladder pus. It settles down quickly. In pyelitic pus, the urine is often over-acid, and will remain clear and acid after standing for perhaps a week. But bladder pus is stringy, and the urine will quickly decompose, and when passed it is frequently ammoniacal or neutral.

Another distinguishing consideration is the amount of albumen present. It is relatively greater in renal puriform urine.

The chance of error is the sympathetic albuminuria that accompanies inflammation of the prostate, or about the trigone.

HÆMATURIA.

The diagnosis of the site and sometimes of the cause, can be easily made in either sex by means of the electric cystoscope, by watching the efflux of urine from the ureters, and examining the bladder under electric light. (Vide Electric Illumination of Bladder, page 119).

Dr. Bolton Bangs[288] lays down the following rule: That blood from the bladder is much more abundant, more likely to clot, more persistent, and when intermittent has shorter intervals than that from the kidney. It is usually associated with some symptom of irritability of the bladder. That diagnosis of source and cause is usually established by bimanual palpation, exploring instruments, such as the sound and electric cystoscope, and that microscopical examination of the urine for casts, crystalline and granular material, neoplastic *débris* and epithelium, is of great aid.

Dr. Keyes refers to Dr. Otis' resorption test, which is said to be of use in hæmorrhage from an ulceration of the bladder. If there is an excoriation of the bladder wall and a solution of iodide of potassium is injected into the bladder, the drug is quickly absorbed, and at the end of a very short time its presence is demonstrable in the saliva by means of the starch iodine reaction.

Dr. Tuttle states he had found powdered cinnamon very valuable in the treatment of bleeding from the genito-urinary tract.

Longstreet Taylor[289] asserts that hæmaturia occurs in 50 per cent. of primary malignant disease of the kidney in children, is generally late in its appearance, and appears after the tumour has become apparent to sight and touch.

Dr. Magner[290] relates a unique case of hæmaturia in a a boy two and a-half years old, which was due to a strongylus gigas in the left kidney. Pieces of the worm were passed, but the kidney degenerated into an enormous carcinoma (?)

Additional Remedies. — Turpentine, ♏ 3, in acute Bright's disease, ʒj t.d. in Egyptian endemic hæmaturia; hamamelis virginica, ♏ 5 to 10, four times a day, in constant passive hæmorrhage without inflammation; chimaphila, tinc. ♏ 5 to 20, also in passive hæmaturia; quinine, large doses, in hæmaturia following malaria. Of astringents, gallic acid, gr. 10, often repeated, seems preferable.

Guyon[300] prefers those agencies which improve the condition of the blood, such as tannin and cinchona.

RETENTION OF URINE.

Is Aspiration for the relief of Vesical Distention always practicable?

This question is asked by Eugene Fuller,[291] who reports a case in which aspiration above the pubes was impossible.

A patient sixty-five years of age was seized with retention, and commenced catheter life. Maltreatment induced a deep false passage, and catheterism became impossible. An attempt was made to aspirate above the pubes, but the anterior part of the enlarged prostate was struck each time, and by percussion it was obvious that the peritoneum descended too near the pubes for the needle to be inserted higher.

Under an anæsthetic, an English catheter on a stylet was introduced, and a quart of foul-smelling urine was

withdrawn, and on deep suprapubic pressure the prostate could be felt much enlarged. The patient became uræmic, and sank at the end of a week.

The value of the case is much diminished by the absence of a *post-mortem*, and any clue as to the character of the extraordinarily enormous enlargement of the anterior lobe of the prostatic body is lost.

SPECIAL POINTS OF GENERAL IMPORTANCE IN SURGICAL URINARY DISEASES.

Koch's Tuberculin.

Guyon, Albarran, Hurry Fenwick,[292] Burchkardt of Basle, and Kelly of New York, have worked with Koch's fluid in tuberculosis of genito-urinary organs without much result; dangerous symptoms have ensued in some cases.

Tuberculosis Uro-Genitalis.

Dr. J. P. Bryson[293] of St. Louis, has made a clinical study of eighty-four cases of the disease, and of twenty-three operations done on fourteen patients and concludes—

(1,) That all the evidence tends to show that we have to deal even in the earliest recognizable stages, with a general disease manifesting itself by localisations.

(2,) That present experience does not warrant the belief that operations, however extensive, undertaken with a view of excising localised lesions, and therefore radically curing the disease will be successful.

(3,) That our chief resource is still in general anti-tubercular treatment, and that surgical interference should be reserved for the palliation and relief of pain, bleeding and wasting suppuration.

The Pathology of Urinary Infection.

Guyon[294] contributes a valuable article upon the different varieties of germs which may affect the urinary tract, and draws the following conclusions:—

Many of the germs are found to cause no chemical

change in the urine. They may be introduced directly along the urethra into the bladder or indirectly from the blood though the kidneys.

They can never be introduced spontaneously along the male urethra into the bladder when these parts are healthy, though such may be the case in the female, owing to the shortness of the urethra. The factors which aid largely in the propagation of germs when once they have been introduced into the bladder are vesical distension, vesical congestion, stagnation of urine, traumatism of the mucous membrane and neoplasms.

Dr. Noël Halle[295] concludes that urinary fever is directly connected with bacterial production and infection, and that the residual urine affords an admirable media for the cultivation of the micro-organisms.

Mr. Reginald Harrison[296] shows that the occurrence of a distinct variety of acute urinary fever following wounds of the urinary apparatus is largely determined by defective urine drainage, and that the fever which follows these lesions is toxic and not neurotic.

The practical outcome (says Mr. Harrison) of this is, that there is plenty of room for the further employment of the true principles of antiseptics in connection with all urinary operations, especially those in the urethra where the condition necessary for bacteria culture are so often present.

BIBLIOGRAPHY.

KIDNEY.

1. Barth.—(Marburg). Verhandl der Deutsch., Gesellsch für Chirurgie, xxi Congres. "Annals of Surgery," vol. xvi., p. 449, 1892.
2. Schachner.—"Annals of Surgery," vol. xv., p. 81.
3. Robinson.—"Annals of Surgery," vol. xviii., p. 403, 1893.
4. Lewin and Goldschmidt.—"Virchow's Archiv.," Band 134, Heft i, p. 33.
5. Morestin.—"Bull. de la Soc. Anat. de Paris," Fascic. 31, 1892, "Brit. Med. Journ." Epit. p. 33, 1893.
6. "Brit. Med. Journ.," p. 1081, pt. ii, Nov. 16, 1889.
7. Knowsley Thornton.—Surgery of the Kidneys, 1890.
8. Henry Morris.—Surgical Diseases of the Kidneys, 1885.
9. Newman.—Surgical Diseases of the Kidneys, 1889.
10. Bassini.—"Ann. Univ. de Med. a Chir.," Milan, p. 281, 1892.
11. Vannenfrille.—Nephroraphiè, Paris, 1888.
12. Tuffier.—Etude experiment sur la Chir. du rein, 1889.
13. Lane.—Clin. Soc. Trans., 1892, "Brit. Med. Journ." April 16, 1892.
14. Rotch.—"Boston Med. Journ.," May 26, 1892
15. Lindner.—"Wanderniere der Frauen."
16. Keen.—"Annals of Surgery," Aug. 1890.
17. McCoosh.—"New York Med. Journ." p. 281, March 15, 1890.
18. Ceccherelli.—"Centralblatt. für Chirurgie," p. 745, 1883.
19. Langenbuch.—"Deut. Med. Woch." p. 325, 1889.
20. Harrison.—"Lancet," p. 1161, Dec. 7, 1889.
21. Jacobson.—"Brit. Med. Journ.," vol. i, p. 117, 1890.
22. Lawson Tait.—"Brit. Med. Journ.," vol. ii, p. 1084, 1889.
23. Keyes.—"New York Med. Record," Feb. 8, 1890.
24. H. Morris.—"Brit. Med. Journ.," pt. ii, p. 1081, 1889.
25. Jordan Lloyd.—"Practitioner," vol. xxxix, p. 173.
26. Morris.—"Brit. Med. Journ.," May, 1892.
27. Kendal Franks.—Ibid., vol. ii, p. 1088, 1889.
28. H. Morris. "Brit. Med. Journ." pt. i, p. 3, 1893.
29. Schede.—Jahrbucher der Hambürgheschen Staats-Krankenanstalten, "Annals of Surgery," p. 446, vol. xvi, 1892.
30. Barth.—"Deutsche Medicin Wochenschrift," June 8, 1892.

31. Tuffier.—"Archiv. Gén. de Méd," July 1891, Epitome "Brit. Med. Journ.," July 25, 1891.
32. Quoted from Dr. Robert Morris, "New York Med. Journ.," April 4, 1891.
33. Dr. Felix Lequen.—"Annales des Malad. des Org. Genito-Urin.," Aug., Sept., Nov., 1891.
34. Dr. Oscar Bloch.—"Hospital Tidende," No. 1, 1892.
35. Reever.—"Lancet," Dec. 4, 1884.
36. Rawdon.—"Lancet," May 26, 1883.
37. Dr. Drummond.—"Lancet," pt. i, pp. 16, 119, 1890.
38. H. Morris.—"Lancet," June 17, 1893.
39. Lucas.—"Brit. Med. Journ." pt. ii, p. 1343, 1891.
40. McCoosh.—"New York Med. Journ." p. 281, March 15, 1890.
41. Keen.—"Annals of Surgery," vol. xii, p. 94, 1890.
42. Lawson Tait.—"Brit. Med. Journ." 1087, pt. ii, 1889.
43. Albarran.—"La Semaine Médicale," April 30, 1892.
44. Quoted from Knight, on Movable Kidney, p. 51, 1893. [An admirable monograph].
45. Morris.—"Brit. Med. Journ.," pt. i, p. 3, 1893.
46. Murray.—"Prov. Med. Journ.," 1889.
47. Harrison.—Cassell's Year Book, p. 277, 1891.
48. Jacobson.—"Brit. Med. Journ.," vol. 1, p. 117, 1890.
49. Jordan Lloyd.—"Practitioner," vol. xxxix, p. 178.
50. West.—"Lancet," vol ii, p. 104, 1885.
51. Boulby.—Clin. Soc. Trans. vol. xx, p. 14.
52. Wright.—"Medical Chronicle," vi, 642, 1887.
53. Bennett May.—"Brit. Med. Journ.," pt. ii, 1084, 1889.
54. Hurry Fenwick.—"Clinical Journ.," p. 212, Jan. 31, 1894.
55. Morris.—"Brit. Med. Journ.," May, 1892.
56. Keen.—"Therapeutic Gazette," Jan., 1892.
57. Marsh.—"Brit. Med. Journ.," pt. i, p. 712.
58. Day.—Clin. Soc. Trans., p. 24, 1893.
59. Rickman Godlee.—"Lancet," p. 145, Jan. 17, 1891.
60. Mayo Robson.—"Lancet," p. 145, Jan. 17, 1891.
61. Turner.—"Lancet," p. 145, Jan. 17, 1891.
62. Keyes.—"Ann. of Univ. Med. Sci." E. 27, 1893; compare also case by Redmond, "Medical Fortnightly," vol. vi., p. 384, July 16, 1894.
63. T. Jones.—"Medical Chronicle," p. 267, July, 1891.
64. Edmunds.—"Brit. Med. Journ.," April 9, 1892.
65. Bland Sutton.—"Clin. Journ.," Nov. 1, 1893.
66. Abbe.—"Annals of Surgery," vol. xix., p. 58, 1894.
67. Israel.—"Deut. Med. Woch.," No. 1, 1892.
68. Lucas.—Proc. Royal Med. Chir. Soc., Jan. 7, 1891, cp., "Lancet," p. 144, Jan. 17, 1891.
69. Willey Meyer.—"Annals of Surgery," April, 1892.
70. Ralfe.—Cassell's Year Book, p. 134, 1891.
71. Dujardin-Beaumetz.—"Bull. gén. de Thérap.," No. 30, May, 1890.

URETER.

72. Hurry Fenwick.—" Brit. Med. Journ.," June 16, 1888.
73. Dr. Newman.—" Glas. Med. Journ.," 1883.
74. Dr. Newman.—Lectures on Surgery of the Kidney.
75. Brown.—" Annals of Surgery," vol. xix., p. 123, 1894; Johns Hopkin's Bull., Sept. 1893.
76. Albarran.—" Soc. de Biologie," June 1891.
77. Bozemann.—" Inter. Journ. Med. Sci.," p. 259, March, 1888.
78. Kirkham.—" Lancet," March 16, 1889.
79. Twynam.—" Brit. Med. Journ.," vol. ii., p. 240, 1890 " Lancet," Feb. 1, 1890.
80. Dr. Ralfe and Mr. Godlee.—Trans. Clin. Soc., vol. xxii., p. 155.
81. Lane.—" Lancet," vol. ii., p. 967, 1890.
82. Bardenheuer.—" Cent. f. Chir.," s. 185, March, 1882.
83. Morris.—" Lancet," June 17, 1893.
84. Regnier.—" Bull. et Mem. de la Soc. de Chir. de Paris," p. 102, March, 1893.
85. Howard Kelly.—Uretero-ureteral anastomosis, " Annals of Surgery," vol. xix., p. 70, 1894; valuable editorial on Chaput's summary on the literature of the subject, " Annals of Surgery," pt. xx., p. 193, 1894.
86. Penrose.—Implantation of cut ureter into Bladder, " Annals of Surgery," vol. xix., p. 696,
87. Trekaki.—" Gazette des Hôpitaux," Paris, June 11, 1892.
88. Caillé.—" Amer. Journ. Med. Sci.," p. 481, 1888.
89. Davies Colley.—Path. Trans., vol. xxx., p. 310.
90. Meyer.—Resection of vesical end of ureter for tumour of Bladder, " Annals of Surgery," p. 78, vol. xx., 1894.

BLADDER.

91. White.—" Journal of Cut. and Gen.-Urin. Disease," May, 1888.
92. Ultzmann.—" Therap. Gaz.," p. 692, Oct. 15, 1890.
93. Motchütkovsky.—" Vratch," Nov. 17—21, 1883.
94. Hutchinson.—" Lancet," p. 975, May 18, 1889.
95. " Lancet," p. 707, Oct. 5, 1889.
96. " Wagner, Neurol. Centralblatt.," April 15, 1893.
97. Benedikt—" Wien. Med. Presse." 27, 1891.
98. Alexander.—" Journ. Gen.-Urin. and Cut. Diseases," July, 1893.
99. Wredin.—" Centralblatt. für Chir." No. 27.
100. Muller.—" Annales des Mal. Organ. Genit.," Oct. 1892.
101. Keyes.—" Amer. Journ. Med. Sci.," June, 1894.
102. Alexander.—" Journ. Cut. and Gen.-Urin. Diseases," April, 1893.
103. Guyon.—" Annales des Maladies des Org. Genito. Urinaire "

104. Tyson.—"Practitioner," Feb. 1892.
105. Mansel Sympson.—"Practitioner." June, 1892.
106. Belfield.—"Journ. Cut. and Gen.-Urin. Diseases," Aug 1892.
107. Jefsner.—"Lancet," June, 14, 1888.
108. Englisch.—"Wein. Med. Woch.," 42—46, 1892.
109. Reverdin.—"Annal. Mal. Gen.-Urin.," Jan. 1888.
110. Guyon.—"Lecon. Clin.," p. 690, 1888; *cp.* Hartmann. Des Cystites Doulour., 1887.
111. Pilcher.—"Annals of Surgery," May, 1892.
112. Battle.—"Brit. Med. Journ.," p. 1011, pt. 1, 1890.
113. Hurry Fenwick.—Pathol. Soc. Trans., xlii., p. 189, 1892.
114. McGill.—"Lancet," Nov. 8, 1890.
115. Makins.—Trans. Med. Chir. Soc., vol. lxxi.; Sir. W. MacCormac, "Illus. Med. News," Dec. 8, 1888.
116. Pousson.—"Ann. des Mal. des Org. Gen.," Feb.—Aug., 1888.
117. Weir.—"Therap. Gazette, "Jan. 1892; "Boston Med. and Surg. Journ.," vol. cxxv., p. 19.
118. Hulke.—"Lancet," pt. ii., p. 197, 1892.
119. Johnston.—"Brit. Med. Journ.," June, 1893.
120. Keegan.—"Lancet," Oct. 4, 1890; Ibid., March 17, 1891.
121. Freyer.—"Brit. Med. Journ.," May 9, 1891.
122. Gimlette.—"Brit. Med. Journ.," May 9, 1891.
123. Keyes.—"Annals of Surgery," March, 1892.
124. Forbes Keith.—"Brit. Med. Journ.," June 11, 1892.
125. Note on Guyon, Reginald Harrison.—Cassell's Annual.
126. Reginald Harrison.—"Lancet," Sept. 22, 1888.
127. Reginald Harrison.—Cassell's Year Book, p. 209, 1889.
128. Reginald Harrison.—Lettsomian Lectures, "Lancet," Feb. 1888.
129. Walter Rivington.—Med. Chir. Trans., vol. lxix., p. 370, 1886.
130. Hurry Fenwick.—"Lancet," Nov. 17, 1886; Clin. Soc. Trans., vol. xxii.
131. Buckston Browne.—"Lancet," Nov. 17, 1888; Clin. Soc. Trans., vol. xxii.
132. Buckston Browne.—"Lancet," p. 867, April, 19, 1891.
133. Hurry Fenwick.—"Brit. Med. Journ.," pt. i., p. 860, 1894.
134. Sir Henry Thompson.—"Lancet," Mar. 15, 1890.
135. Assendelft.—"Annals of Surgery," p. 293, 1889.
136. C. Williams.—"Lancet," Nov. 24, 1888.
137. Hurry Fenwick.—"Med. Press and Circ." Sept. 24, 1890.
138. Isambard Owen.—"Brit. Med. Journ.," p. 115, Jan. 19, 1889.
139. Hurry Fenwick.—"Brit. Med. Journ.," April, 14, 1888; Oct. 13, 1888; May 9, 1889; Oct. 18, 1890.
140. Hurry Fenwick.—Report of Clinical Evening, Medical Society of London, "Brit. Med. Journ.," p. 1,111, Nov, 19, 1892, "Caisson" Working in Bladder Surgery.

141. Albarran.—"Les Tumeurs de la Vessie," p. 421.
142. Albarran.—"Les Tumeurs de la Vessie," p. 401.
143. Braune-Garson.—"Archiv. für Anatomie," p. 171, 1878; also "Edin. Med. Journ.," Oct. 1878; Petersen, "Arch. für Chirurg." t. xxv., 1880,
144. Trendelenburg. (Eigenbrodt). "Deutsch. Zeitsch. für Chir.," Band. 28, p. 61, Heft, 1 and 2.
145. Hurry Fenwick.—"Brit. Med, Journ.," 1894,
146. Nicaise.—"La Semaine Médicale," Paris, p. 387, 1888.
147. Cadge.—Proc. Roy, Chir. Soc., p. 97, March 30, 1886.
148. Fowler.—"Annals of Surgery," p. 129. vol. xii., 1890.
149. Bristowe.—"Annals of Surgery," vol. xvii., p. 667, 1893.
150. "Archiv. f. klin. Chir.," xxxi., 3. "Brit. Med. Journ.," Oct. 19, 1889.
151. Eigenbrodt.—"Deutsch Zeit. fur Chir.," Band 28, p. 61.
152. McGill.—"Lancet," Nov. 8, 1890.
153. Wickhoff.—"Wien. Klin. Wochensch.," No. 11. 1893.
154. Albarran.—"La Semaine Médicale," Jan. 18, 1893.
155. Senn.—"Philadelphia Med. News," July 1, 1893.
156. Hurry Fenwick.—Trans. Clin. Soc., 1894; "Brit. Med. Journ.," pt. i., p. 752, 1894.
157. Weir.—"New York Med. Journ.," May 30, 1891.
158. Farrar Cobb.—"Boston Med. and Surg. Journ.," Aug. 24, 1893.
159. Willems.—"Annales de la Soc. de Méd. de Gand.," 1892.
160. Wyeth.—"Annals of Surgery," vol. xvii., p. 65, 1893.
161. Hunter McGuire.—"Med. Bull.," Philadelphia, May 17, 1890.
162. Bassini.—"Wiener klin. Wochenschrift," May 29, 1890.
163. Trendelenburg.—"Zeitscrift für Chirurgie," 1890.
164. Van der Veer.—"Albany Med. Annals." July, 1890.
165. Bnckston Browne.—"Brit. Med. Journ.," Mar. 15, 1890.
166. Mayo Robson.—"Brit. Med. Journ.," Oct. 11, 1890.
167. Southam.—"Lancet," March 18, 1893.
168. Hurry Fenwick.—"Brit. Med. Journ,," pt. 2, 1894.
169. Guyon.—"La Semaine Médicale," Feb. 1888.
170. Harison.—Cassell's Year Book, p. 278, 1893.
171. Forbes Keith.—"Brit. Med. Journ.," June 11, 1892.
172. Bolton Bangs.—"Journ. of Cut. and Gen-Urin. Diseases." July 16, 1892.
173. Keyes.—Ibid., p. 34, Jan. 1893.
174. Edmund Owen.—"Lancet," March 21, 1891.
175. Max Nitze.—"Wien. Med. Presse," xx., p. 851—859, 1879.
176. Newman.—"Glasgow Med. Journ.," Aug. 1883.
177. Mayo Robson.—"Lancet," p. 341, Aug. 22, 1885.
178. Max Nitze.—Lehrbuch. der Kystoscopie, Wiesbaden, 1889.
179. Hurry Fenwick.—Electric Illumination of the Bladder and Urethra, 2nd edit., 1889.
180. Sir Henry Thompson.—Tumours of the Bladder, 1884.

181. Sir Henry Thompson.—Clinical Lectures on Diseases of the Urinary Organs. Sixth edit., p. 21, 1882.

DISEASES OF THE PROSTATE.

182. Reginald Harrison.—Cassell's Year Book, 1893.
183. Dr. Webb.—"New York Med. Journ.," p. 706, 1888.
184. Reginald Harrison.—Pathology and Treatment of the Enlarged Prostate, "Lancet," 1888.
185. Berkeley Hill.—Chronic Urethritis and its treatment, 1890.
186. Oberlander.—"Journ. Cut. and Gen-Urin. Disease," July, 1891; "Brit. Med. Journ.," Epit., 165, Aug. 13, 1891.
187. Hurry Fenwick.—Electric Illumination of Bladder, 2nd edit., 1889.
188. Arbuthnot Lane.—"Lancet," p. 931, May 24, 1891.
189. Keyes.—"Journ. Cut. and Gen.-Urin. Disease," p. 34, Jan. 1893.
190. W. T. Belfield.—"Journ. Amer. Med. Assoc.," Sept. 4, 1886; "The Medical Record," Aug. 21, 1886; "Journ. Amer. Med. Assoc.," March 12, 1887.
191. McGill.—"Brit. Med. Journ.," Nov. 19, 1887.
192. Charles Briddon.—"Annals of Surgery," vol. xvii., p. 64, 1893.
193. White.—"Annals of Surgery," vol. xvii., p. 970, also vol. xviii., p. 152, 1893.
194. Griffiths.—"Journ. Anat. and Physiol." Oct., 1889.
195. Bier.—"Wiener Klinisch Wochenschrift," No. 32, Aug. 10, 1893.
196. Willey Meyer.—"Annals of Surgery," 44, July, 1894.
197. Eigenbrodt.—"Beiträge zur Klin. Chir.," No. 8, 1891. "Brit. Med. Journ.," Epit., Nov. 7, 1891.
198. Belfield.—"American Journ. Med. Sci.," Nov., 1890.
199. Ramm.—"Centralblatt. für Chirurgie," No. 35, Sept. 2, 1893; Ibid., No. 17, April 28, 1894.
200. Powell.—"Brit. Med. Journ.," Nov. 18, 1893.
201. Haynes.—"Philadelphia Med. News," Dec. 30, 1893; "Buffalo Med. and Surg. Reporter," March, 1894.
202. White.—"Brit. Med. Journ.," p. 1353, pt. i., June 23, 1894.
203. Meyer.—Centralblatt. für Harn und Sexual Organe," Band v., Heft 7, p. 329, 1894.
204. Reginald Harrison.—Surgical Disorders of Urinary Organs, p. 239.
205. Thornton.—"Annals of Surgery," vol. ii., p. 424, 1885.
206. Israel.—"Deut. Med. Wochenschrift," No. 1, Jan. 5, 1888.
207. Mansell Moullin.—"Brit. Med. Journ.," June 18, 1892.
208. Weir.—"New York Med. Journ.," May 30, 1891.
209. Prof. S. Sörensen.—"Zeits. f. Klin. Mediz." Band 18, Heft. 3, 1889.

210. Spannochi de Ferrara.—"Revue Chirurgicale," No. 24, 15, xii., 1890.
211. Schmidt.—"Deut. Zeit. für Chir.," Band 28, Heft 4—5, 1888.
212. Buckston Browne.—"Lancet," p. 987, pt. i., 1889.
213. Arbuthnot Lane.—"Lancet," p. 836, April 27, 1889.
214. McGill.—Clin. Soc. Lond., Nov. 11, 1887; "Lancet," Aug. 24, 1889.
215. Bottini.—"Brit. Med. Journ.,' p. 408, pt. ii., 1890; "Lancet," vol. i., p. 582, 1885; "Brit. Med. Journ.," vol. i., p. 1121, 1891.
216. Tobin.—"Brit. Med. Journ.," March 14, 1891.
217. Hurry Fenwick.—Cardinal Symptoms of Urinary Disease, p. 187.
218. Pyle.—"Brit. Med. Journ.," Aug. 17, 1892.
219. Norton.—"Med. Press and Circ.," Jan. 27, 1892.
220. Keyes.—"Medical Record," Sept. 17, 1892.
221. "Annals of Surgery," vol. xvi., p. 454, 1892.
222. Bolton Bangs.—"Annals of Surgery," p. 442, vol. xvii.
223. Caspar.—"Annal Mal. Gen.-Urin.," 1888.

SEMINAL VESICLES.

224. Jordan Lloyd.—"Brit. Med. Journ.," April 20, 1889.
225. Ullmann.—"Centralblatt. für Chirurgie," Feb. 22, 1890.
226. Roux.—"La Semaine Médicale," April 8, 1891,
227. Villeneuve.—"La Semaine Médicale," Sept. 23, 1891.

URETHRA.

228. Hurry Fenwick.—A novel extension of the uses of Cocaine, "Lancet," May, 1888.
229. M. Simes.—"Lyon Médicale," Oct. 1889.
230. Glenn. "Nashville Southern Practitioner," April 1891.
231. Hurry Fenwick.—Electric Endoscopy, p. 133, 1888.
232. "Annal de Mal. de Genito.-Urin.," March, 1888.
233. "Annales," Oct. 1888. "Brit. Med. Journal," May 21, 1892
234. Woolcombe.—"Lancet," Nov. 10, 1888.
235. Marmaduke Shield.—"Lancet." 1888.
236. Teale.—"Lancet," Aug. 17, 1889.
237. Fessenden N. Otis.—The male urethra, its diseases, etc.
238. White.—"Annales des Mal. Org. Gen-Urin." Nov. 1888.
239. Harrison.—"Lancet," Dec. 29, 1888.
240. Thompson.—"Brit. Med. Journ." Feb. 9, 1889.
241. Lavaux.—"Le Progres Médicale," Nov. 12, 1887.
242. Hurry Fenwick.—"Illustrated Med. News," Nov. 3, 1888.
243. Howse.—Trans. Clin. Soc., vol. xii., 1878.
244. Troisfoulaines.—"Annales de la Soc. Méd. Chir. de Liége.," March, 1888.
245. Vigo of Caen.—"Annal Genito.-Urin.," June, 1888.

246. Morgan.—"Practitioner," 1888.
247. Vignard.—"Archiv. Prov. de Chirurg.," also "Journ. Cut. and Gen.-Urin.," p. 241, June, 1893.
248. Keyes.—"Journ. Cut. and Gen.-Urin. Diseases," 1892.
249. Manley.—"Annals of Surgery," vol. xvii., p. 188.
250. Guyon.—"Gazette Hebdomedaire," May 14, 1892.
251. Jouon.—"Sem. Médicale," May 14, 1892.
252. Quénu.—"Semaine Médicale," May 11, 1892.
253. Despres.—Ibid., and "Brit. Med. Journ.," May 21, 1892.
254. Bruce Clark.—"Brit. Med. Journ.," Sept. 19, 1885; also "Practitioner," 1886.
255. Newman.—Trans. Med. Soc., New York, 1874
256. Swinford Edwards,—"Med. Press and Circ.," 1888, and "Brit. Med. Journ.," June 2, 1888.
257. Tilden Brown.—"Journ. Cut. and Gen.-Urin. Diseases," July, 1888.
258. Prof. E. L. Keyes.—"New York Med. Journ.," Oct. 6, 1888.
259. Dr. Ady.—"Medical and Surg. Report," Oct. 27, 1888.
260. Dr. Fort.—Nouveau procédé pour quérir des rétrécissements de l'Urethre., Paris, 1888.
261. Bruce Clarke.—"Practitioner," 1886.
262. Brewer.—"Journ. Cut. and Gen.-Urin.," March, 1891.
263. Goll.—Corresp. blatt. für Schweizer Aerzte. Basel., xxi., 1891.
264. Brewer.—"Journ. Cut. and Gen.-Urin.," July, 1888.
265. Rand.—"New York Med. Journ.," 1887.
266. Berkeley Hill.—Chronic Urethritis and its treatment, 1890.
267. Corresp. für Schweitzer Aertz., 1887.
268. Lohnstein.—"Lancet," March, 1888.
269. Keyes.—"Medical Record," New York, July 25, 1891.
270. Margarith.—"Lancet," Aug., 1888.
271. Rademaker.—"Union Médicale," June, 1888.
272. Grunfeld.—"Annales Gen. Urinaire," Jan. 1888.
273. Smith.—"Lancet," Sept. 1, 1888.
274. Hurry Fenwick.—"Brit. Med. Journ.," Feb. 4, 1888.
275. Geza von Antal. Pathologie der Harnröhre., p. 50, 1888.
276. Franz Heuel, Junr.—"New. York Med. Journ.," Feb. 22, 1890.
277. Hilton.—Rest and Pain. p. 248., 2nd edit.
278. Oberländer.—"Internat. Centralblatt. Harn Organe," Band ii., Heft. 5.
279. Otis.—Ibid.
280. Kollmann.—Ibid.

SPECIAL SYMPTOMS.

281. Baruch.—"Arch. of Pediatrics." April 1889.
282. Gersuny.—"Lancet," p. 1317, pt. i., 1889.
283. Jacobson.—"Lancet," p. 1138, June 8, 1889.

284. Kupke.—"Lancet," p. 1111, Nov. 2, 1890.
285. Stevenson.—"Lancet," Jan. 10, 1891.
286. Settier.—"Gaceta de Enferne de los Org. Gen.-Urin.," May, 1888.
287. Keyes.—"Journ. Cut. and Gen.-Urin. Dis.," p. 236, 1892.
288. Bolton Bangs.—Ibid., p. 35, Jan. 1893.
289. Taylor.—"Ann. des Organ. Gen.-Urin.," July, 1888.
290. Magner.—"Journ. de Bordeaux," Feb. 26, 1888.
291. E. Fuller.—"Journ. Cut. and Gen.-Urin. Dis.," p. 190, 1892.
292. Hurry Fenwick.—Trans. Pathol. Soc., vol. xlii., p. 189, 1891.
293. Bryson.—"Journ. Cut. and Gen.-Urin, Dis.," July, 1890.
294. Guyon.—"La Pratique Médicale," Paris, May 10, 1892.
295. Noel Halle.—"Annal des Maladies des Org. Gen.-Urin.," Feb. 1892.
296. Harrison.—Lettsomian Lectures, No. 1, 1888.
297. Horwitz.—"Wein. Med. Press," 1889.
298. Picard.—"Gaz. des Hôpitaux," No. 28, 1890.
299. Bruce Clarke.—Harveian Society, May 17, 1888,
300. Felix Guyon.—"Annales des Maladies des Organ. Genito.-Urin.," No. 1, 1889.
301. Willey Meyer.—Morrow's System of Genito-Urinary Disease, vol. i., pt. i., p. 457.
302. Albarran.—Ibid.
303. Reclus.—La Médical Moderne, Nr. 24, S. 372, 1894.

GENERAL INDEX.

A

ACCESSORY adrenal tumours ... 40
Adrenal tumours 39
Aero-urethroscopy 190
— Clinical value of 195
— Dangers of 193
— Fallacies in 193
— Treatment of urethritis by .. 199
Anuria, obstructive 41
Aspiration of bladder 205
— — Kidney 6
Ataxial bladder 58
Atony of bladder 58

B

BIBLIOGRAPHY 208
Bladder, ataxia of 58
— Atony of.. 58
— Drainage of 111
— Encysted stone of 77
— Epithelioma of.. 93
— Fistula of 65
— Hæmorrhage from, controlled 110
— Inflammation of 59
— Irritable.. 57
— Resection of 110
— Rupture of 66, 117
— Stone of.. .. .. 68, 128
— — — Children.. 69
— — — — Choice of operation in 71
— — — — Statistics of.. .. 71
— — — — Technique of operations 113
— Surgery of 57
— Tuberculosis of.. .. 65, 130
— Tumours of 86
— — — Statistics of .. 103, 105
— — — Symptoms of 91
— — — Treatment of 98
— Ulceration of 129

C

CAISSON working 101
Calculous pyelitis 33
Calculus in bladder .. 68, 128
— — — in childhood 69
— — — Encysted 77
— — — Failures in sounding for 85
— — — Insular distribution of.. 86
Calculus in bladder, post-prostatic 78
— — — — Sounding for .. 81
— — — Pulverization of .. 76
— — — Statistics 82
— — Kidney, *vide* Stone in kidney .. .. ..
Catheterism, retrograde 170
Cocaine, deaths from injection of 165
Cystitis 59
— Microbe of 60
— Nodular 59
— Treatment of 61
Cystoscopy, electric 119
— in post-prostatic stone 81
— in prostatic tubercle 138
— Suprapubic 81
— Value of.. 126
Cystotomy, suprapubic 106
— Statistics of 112
— Technique of 106

D

DRAINAGE, suprapubic 111

E

ELECTRIC cystoscopy .. 49, 119
Electrolysis, linear, for stricture 176
— for stricture 173
Encysted stone of bladder . 77
Enlarged prostate 141
— — Treatment of 141
Epithelioma of bladder 93
— — Kidney 40
Excision of stricture 171
Extravasation after litholapaxy 116

F

FISTULÆ, nephro-intestinal .. 36
Floating kidney 24

G

GLEET 182
— Treatment by electric urethroscopy.. 188
Gonococcus, persistence of 183
Gonorrhœa 182

H

Hæmaturia 123, 129, 204
Hæmorrhage from bladder .. 110
— — prostate, control of .. 155
Hydronephrosis, due to movable kidney 24

I

Incontinence of urine 200
Injections of cocaine 165
— in gleet 183
Insufficiency of kidney 46

K

Kidney, aspiration of 6
— Cysts of 19
— Epithelioma of 40
— Floating 24
— Movable 24
— Neuralgia of 21
— Operations on 6
— Palpation of 20
— Puncture of 6
— Rupture of 21
— Stone in 11
— — Statistics 11, 36
— — Treatment of 28
— Syphilis of 41
— Tuberculosis of 37
— Tumours of 37
— Wounds of 1, 2
— Villous growths in pelvis of .. 37
Koch's methods 65, 206

L

Litholapaxy, accidents in .. 116
— in Children 69, 113
— Evacuation of *débris* in .. 114
— in Females 113
Lithotomy 77
Lithotrity, perineal 76

M

Masturbation 135
Movable kidney 24
— — Dangers of 25
— — Treatment of 27

N

Needling of kidney 7, 14
Nephrectomy 15
— Indications for 15
— Statistics of 17, 18, 19
— Technique of 15
Nephro-intestinal fistula 36
Nephro-lithotomy 11
— — Fatal hæmorrhage in .. 35
Nephrorrhaphy, experimental work on 4
— Technique of 8
Neuralgia of kidney 21

O

Obstructive anuria 41

P

Pain in penis 140
Palpation of kidney 20
Perineal lithotrity 76
Photography of bladder .. 125
— — Urethra 200
Post-prostatic stone 78
Prostate, concretions in 140
— Enlargement of 141
— — Castration for 148
— — Ligature of internal iliacs in 149
— — Thermo-galvanic cautery for 157
— Diseases of 132
— Examination of 132, 133, 199
— Inflammation of 133
— — — Sequelæ 136
— — — Suppuration in 137
— — — Treatment in 136
— Removal of enlarged .. 143
— Stenosis of 140
— Tuberculosis of 137
Prostatectomy 143
— Checking hæmorrhage in .. 155
— Technique of 150
Prostatic écraseur 151
— Knife 154
Pyelitis 49, 54
Pyuria 124, 203

R

Renal cysts 19
— Pyuria 124
— Sarcomata 39
— Stone 28
Resection of bladder 110
Retention in stricture 168
— of urine 205
Rupture of bladder 117
— — Kidney 21
— — Urethra 166

S

Seminal vesiculitis 163
Statistics, bladder stone 71, 82
— Kidney stone 36
— Suprapubic cystotomy .. 112

Stone in Bladder 68
— — — Children .. 69, 113
— — — Female 113
— — — Insular distribution of 56
— — — Operations for 71
— — — Sounding for .. 81, 85
— — Kidney, statistics of . 11, 36
— — — Symptoms of 28
— — — Treatment of . . 28
— Post-prostatic 78
— Prostatic 140
— in Ureter 54
Strangury 58
Stricture of urethra .. . 167
— — — Aero-urethroscopy for 198
— — — Electrolysis for .. 173
— — — Excision of .. . 171
— — — Operations in 170
— — — Retention in . .. 168
Suppression of urine 41
Suprapubic cystotomy 106
Suture of bladder 111
— — Kidney wound 2
— — Ruptured urethra .. 167
Symphyseo-cystotomy 109
Syphilis of kidney 41

T

Technique for electrolysis of stricture 176
— — Kidney operations .. 6
— — Nephrectomy 15
— — Nephrorrhaphy 8
— — Nephrotomy . .. 10
— — Prostatic operations .. 150
— — Stone operations 76
— — Suprapubic cystotomy .. 106
Testicles, ablation of, for enlarged prostate . 148
Trendelenburg's position .. 107
Tuberculosis of bladder .. 130
— — Kidney 37
— — Prostate 137
— — Urogenitalis 206
Tumours of bladder 86
— — Kidney 37

U

Ureter, diseases of 49
— Electric examination of .. 49
— Extirpation of 54
— Inflammation of 49
— Grafting of 55
— Plastic operation on .. 54
— Occlusion of 5
— Prolapse of 56
— Resection of 54
— Stone in.. 54
Uretero-enterostomy 6
Uretero-ureteral anastomosis .. 55
Urethra, diseases of 165
— Electrolysis in.. 173
— Excision of 171
— Operations on 170
— Rupture of 166
— Stricture of 167
Urethritis 182
— Treatment of . .. 183, 199
Urethroscopy, electric 188
Urinary fever 206
Urine, retention of .. 168, 205

V

Vesical diseases, *vide* Bladder
— irritability 57
Villous tumour of bladder .. 86
— — — Kidney 37

2527.94 JOHN WRIGHT AND CO., STONE BRIDGE, BRISTOL.

MEDICAL WORKS

PUBLISHED BY JOHN WRIGHT & CO., BRISTOL.

Post 8vo. Illustrated with Coloured Plates, and in Black and White. 8/6, *post free.*

DISEASES OF THE UPPER RESPIRATORY TRACT: THE NOSE, PHARYNX, AND LARYNX. By P. WATSON WILLIAMS, M.D. Lond., Phys. in charge of Throat Dept. Bristol Roy. Infirm.; Hon. Phys. to the Institute for the Deaf and Dumb.

Large 8vo. 6/-, *post free.*

SHAW'S EPITOME OF MENTAL DISEASES: With the Present Methods of Certification of the Insane, and the Existing Regulations as to "Single Patients." A Book of Reference for Practitioners and Students, Alphabetically arranged. By JAMES SHAW, M.D.

Large 8vo. Illustrated. 3/6, *post free.*

MYXŒDEMA, THE GOITRES, AND CRETINISM. By EDWARD T. BLAKE, M.D., M.R.C.S., Life Assoc. Sanitary Institute, Great Britain; Member French Hygienic Society; Hon. Member Michigan Medical Society; Found. Fell. Brit. Gyn. Soc.

Reprint. Large 8vo. Illustrated. 6/-, *post free.*

THE PRACTICE OF HYPNOTIC SUGGESTION: Being an Elementary Handbook for the use of the Medical Profession. By GEORGE C. KINGSBURY, M.A., M.D. (University of Dublin).

Demy 8vo. Illustrated. 6/6, *post free.*

SAUNDBY'S LECTURES ON BRIGHT'S DISEASE: Illustrated with 50 Wood Engravings. By ROBERT SAUNDBY, M.D. Edin., F.R.C.P. Lond., Professor of Medicine in Mason College, Birmingham; Physician to the General Hospital, Birmingham.

Demy 8vo, with Illustrations. 7/6, *post free.*

SAUNDBY'S LECTURES ON DIABETES: Including THE BRADSHAWE LECTURE, delivered before the Royal College of Physicians in 1890. By ROBERT SAUNDBY, M.D. Edin., F.R.C.P. Lond.

MEDICAL WORKS

PUBLISHED BY JOHN WRIGHT & CO., BRISTOL.

Twelfth Thousand. 2/-, *post free. Pocket size. Upwards of* 80 *Illustrations. Adopted by the St. John Ambulance Association.*

PYE'S ELEMENTARY BANDAGING AND SURGICAL DRESSING: With Directions concerning the Immediate Treatment of Cases of Emergency. Mostly condensed from "*Pye's Surgical Handicraft.*" By WALTER PYE, F.R.C.S.

Second Edition. 400 *pp.*, 8*vo.* 60 *Illustrations.* 7/6, *post free.*

STRETCH DOWSE'S LECTURES ON MASSAGE AND ELECTRICITY in the Curative Treatment of Disease. By THOMAS STRETCH DOWSE, M.D. F.R.C.P., Edin., Formerly Phys. Supt. Cent. Lond. Sick Asyl., Assoc. Mem. Neurological Soc., New York.

Pocket Size. Limp Covers. 2/-, *post free. With numerous Illustrations, reduced from the larger work by the same Author.*

STRETCH DOWSE'S PRIMER OF THE ART OF MASSAGE (for Learners). By THOS. STRETCH DOWSE, M.D.

Small 4*to. Cloth lettered. Price* 2/6, *post free.*

RHEUMATISM; some Investigations respecting its Cause, Treatment, and Cure. By PERCY WILDE, M.D.

Yearly, 8*vo, Cloth, about* 800 *pp. Illustrations and Coloured Plates.* 7/6 *post free.*

THE MEDICAL ANNUAL: A Complete Work of Reference for Medical Practitioners. Combines the features of an Annual Retrospect with those of a Medical Encyclopædia. It occupies a *unique* position in medical literature.

Third Edition. 8*vo, thick paper covers,* 1/6; *or Cloth,* 2/6, *post free.*

OUR BABY; A BOOK FOR MOTHERS AND NURSES. By Mrs. LANGTON HEWER, Diplomée Obstet. Society, London; late Hospital Sister. Author of "Antiseptic Nursing."

MEDICAL WORKS

PUBLISHED BY JOHN WRIGHT & Co., BRISTOL.

Second Edition. Revised and Enlarged, 8vo. Illustrated. 4/6, post free.

OPHTHALMOLOGICAL PRISMS AND THE DECENTERING OF LENSES: A Practical Guide to the Uses, Numeration, and Construction of Prisms and Prismatic Combinations, and the Centering of Spectacle Lenses. Illustrated by Sixty-nine Original Diagrams. By ERNEST E. MADDOX, M.D.

Large 8vo. Bevelled Boards. Illustrated. 6/-, post free.

SNELL'S MINERS' NYSTAGMUS: and its Relation to Position at Work and the Manner of Illumination. With numerous Fine Illustrations. By SIMEON SNELL, F.R.C.S., Ophthalmic Surgeon to the Sheffield General Infirmary.

Crown 8vo. Illustrated. 2/6, post free.

NOTES ON NURSING IN EYE DISEASES. Illustrated with Wood Engravings and Process Blocks. By C. S. JEAFFRESON, M.D., F.R.C.S.,E., Senior Surg. Northumberland, Durham, and Newcastle Infirmary for Diseases of the Eye.

Third Edition. Waistcoat Pocket Size. Stiff Paper Covers, 1/-, post free.

FENWICK'S GOLDEN RULES OF SURGICAL PRACTICE: For the Use of Dressers and Junior House Surgeons. By E. HURRY FENWICK, F.R.C.S., Surgeon to the London Hospital and St. Peter's Hospital for Urinary Diseases.

Third Edition. 10/6, post free. Illustrated with 235 Engravings.

PYE'S SURGICAL HANDICRAFT: A Manual of Surgical Manipulations, Minor Surgery, etc. For the use of General Practitioners, House Surgeons, Students, and General Dressers. By WALTER PYE, F.R.C.S. Revised and Edited by T. H. R. CROWLE, F.R.C.S. With Special Chapters on Aural Surgery, Teeth Extraction, Anæsthetics, etc., by Messrs. FIELD, HOWARD HAYWARD and MILLS.

Cheaper Edition. Large 8vo. Cloth, 4/6, post free. 80 Illustrations.

PYE'S SURGICAL TREATMENT OF CHILDREN'S DEFORMITIES. By WALTER PYE, F.R.C.S., Author of "Surgical Handicraft."

MEDICAL WORKS

PUBLISHED BY JOHN WRIGHT & CO., BRISTOL.

Large 8vo. 6/-, post free.

DISEASES OF INEBRIETY from Alcohol, Opium, and other Narcotic Drugs; its Etiology, Pathology, Treatment, and Medico-Legal Relations. By the American Association for the Study and Cure of Inebriety.

Second Edition, Enlarged. Crown 8vo. 2/6, post free.

THE WORKHOUSE AND ITS MEDICAL OFFICER. By ALFRED SHEEN, M.D., M.R.C.S., Senior Surg. Glamorgan and Monmouthshire Infirmary, Cardiff.

Imperial 16mo. 3/6, post free.

PTOMAINES AND OTHER ANIMAL ALKALOIDS: THEIR DETECTION, SEPARATION, AND CLINICAL FEATURES. By A. C. FARQUHARSON, M.D., D.P.H. Cantab., Senr. Assist. Med. Officer, the County Asyl. Lichfield.

With Flexible Leather Flap Cover, Two Pockets and Fastener, 5/6 post free.

WRIGHT'S IMPROVED PHYSICIANS', SURGEONS' AND CONSULTANTS' VISITING LIST. Compiled by ROBERT SIMPSON, L.R.C.P., L.R.C.S.

Gold Stamped, Round Corners, Gilt Edges, 4-in. × 6½-in., Printed and Perforated. 1/- each, or 10/- per dozen, post free.

WRIGHT'S NEW PRESCRIPTION BOOKS. Single or Duplicate.

Ninetieth Thousand. Samples free on application.

WRIGHT'S REGISTERED POCKET CHARTS, for Bedside Case Taking. Compiled by ROBERT SIMPSON, L.R.C.P., L.R.C.S.

Samples free on application.

REGISTERED COMBINATION TEMPERATURE AND DIET CHARTS, with Clinical Diagrams, specially arranged for Hospital use. Designed by ROBERT SIMPSON, L.R.C.P., L.R.C.S.